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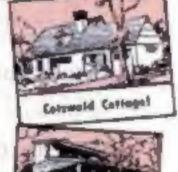
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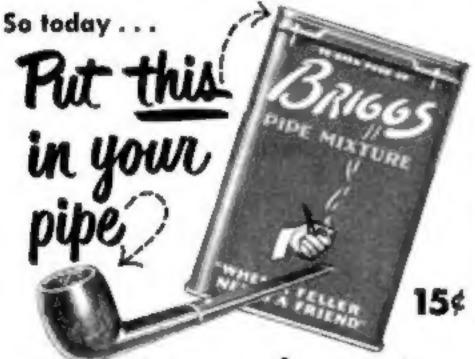


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# Camera Case Solved

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HAVE you postponed buying a case for your camera because of the excise tax on leather goods? You can make a neat carrying case yourself out of leather from an old brief case or handbag. Walter E. Burton will tell you how to go about it in POPULAR SCIENCE next month.

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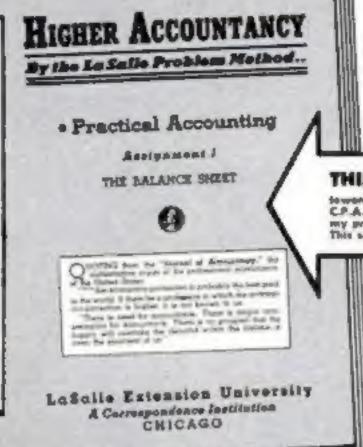
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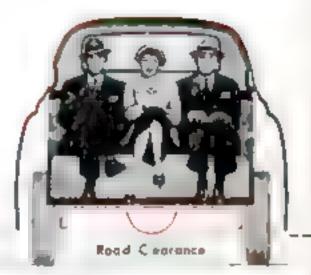
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nificent beauty. It provides full road clearance and the most room in any automobile at any price! It creates America's lowest center of gravity, which brings you the best and safest ride ever known. Won't you accept your Hudson dealer's invitation-enjoy "The New Step-Down Ride" soon?



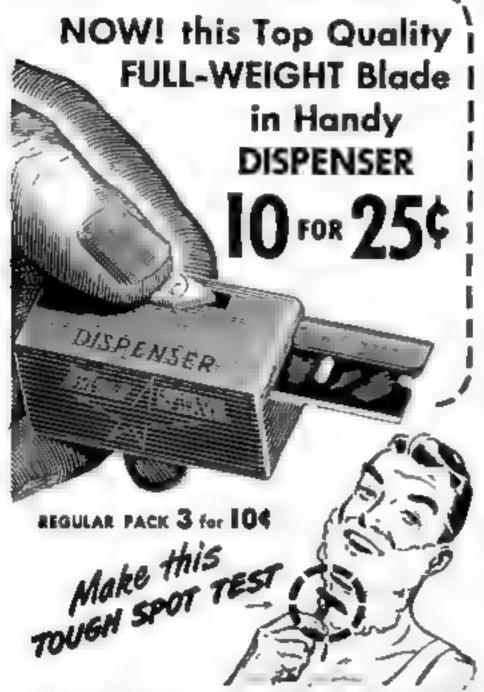
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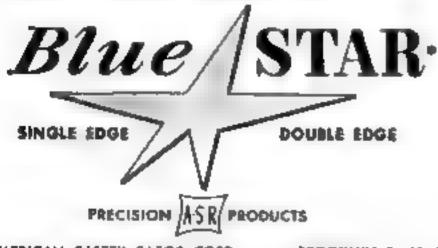
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# Letters



## First Mechanical Dishwasher?

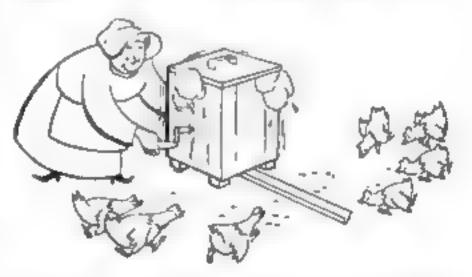
Sir:

The interesting article on Mr. La Raus's simplified dish-washing machine in your January issue [p. 116] prompts me to raise the question: Are mechanical dishwashers new?

In the early '90s while visiting an old farmhouse about half way between New Haven and Hartford, Conn., I had the doubtful pleasure of operating what, I am convinced, was one of the earliest—if not the first—mechanical dishwasher in the U.S.A. The owner of the farm, who was then about 80 years old, told me the dishwasher had been in use there as long as she could remember.

The washer was a square wooden tub, at the bottom of which was a paddle wheel connected through a train of gears to a hand crank. Soiled dishes were stacked on a rack inside, a solution of soft soap and three or four gallons of boiling water was poured over them, and the cover was tightly fastened.

As the operator turned the crank, about 60 times, the paddles splashed soapy water



over the dishes. The plug was then pulled, allowing the water to run into a trough that drained into the farmyard—where chickens feasted on the food scraps from the dishes. A second filling of hot water, without soap, rinsed the dishes.

C. M. HUNTLEY

Seattle, Wash.

### What's a Screwdriver For?

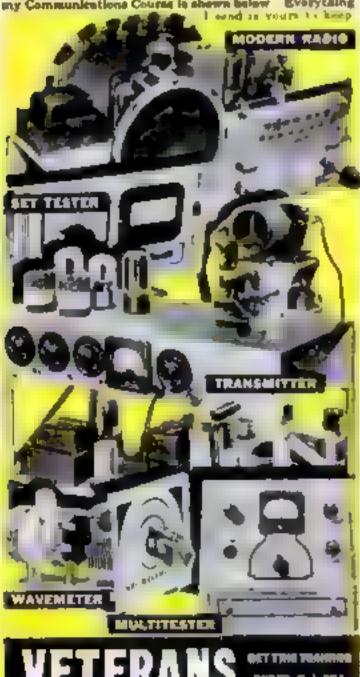
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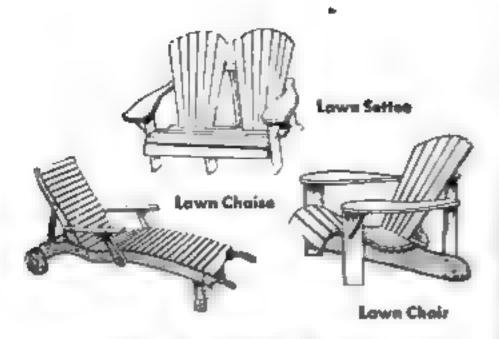
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POPULAR SCIENCE

your March issue, page 20, where you say that prying open a drill chuck is not a legitimate job for a screwdriver.

A screwdriver is a universal tool and is used much more for prying, chiseling, wedging, etc., than for driving screws. When doing a job, your aim is not to save wear and tear on a cheap screwdriver—but to get the job done.

Screwdrivers are easily straightened and reground, and they come with shatterproof handles. So why not use them for any job

that they will fit?

HARRY S. DAVIS

Nelsonville, O.

# Shocking Suggestion?

Sir:

Some time back you showed how to make an unbreakable lamp pull with a wire banjo string and a shower-curtain ring [PS, Dec. '49, p. 155]. It seems to me that hooking a wire to an electric fixture is a sure way to get a shock.

MERLE HARTZ

Pleasantville, Ia.

A wire pull is no more dangerous than the standard beaded metal chain. In kitchen or bathroom, where the floor might be damp, insert an insulating link in either pull. It is also advisable to use a porcelain, rather than metal, socket and base.

# The Great Conduit Mystery

Sir:

"The Height of Ingenuity" in your December issue, p. 214, set me wondering what kind of conduit they use in Chile. Writing from there, Mr. Federico Strasser tells how he located the end of a conduit inside a wall by feeding a small bar magnet into it, on the end of a copper wire, and then locating the magnet by moving a compass over the outside of the wall.

Have you ever tried to feed a bar magnet into a conduit? All the conduit I know of is either steel or fron; and any magnet stuck into it will immediately adhere to the wall of the conduit.

But supposing that, by sheer force, the magnet could be persuaded to reach the end of the conduit. Then would not the conduit itself prove a magnetic shield between the

magnet and the compass needle?

In conclusion: Why use a magnet at all?

# INVENTORS

Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

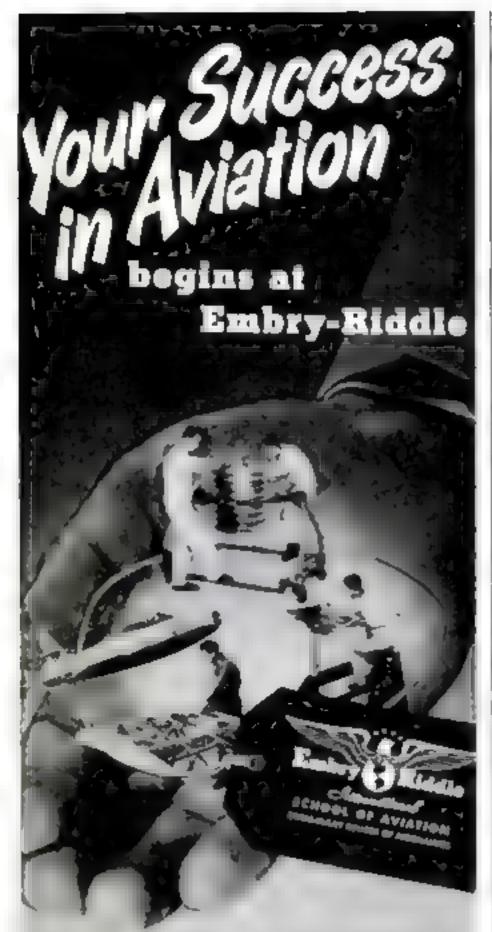
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A compass needle, even though minute in power, is sensitive enough to point itself at any hidden conduit or even BX.

Is Mr. Strasser pulling your leg; or do they use very, very expensive non-magnetic conduit in Chile?

FRANK S. HALL

Terryville, Conn.

We'll let our Chilean correspondent, Mr. Strasser, annuer for himself:

Mr. Hall's objections are perfectly legitimate—theoretically. But there are some "buts." Allow me, however, to tell you, first, what happened to my mother.

After her marriage, she wrote to her mother, telling her what a splendid provider her husband was: even for kitchen work, she reported, she wore silk dresses he had given her. To which my poor grandmother answered by lamenting that her son-in-law must be very poor if he was not able even to afford a cotton dress for his wife to wear while cooking.

The same thing happens in this country. We are very poor—in dollars and foreign currencies—and haven't got money to buy iron or steel for our conduit. But this country is one of the greatest producers of copper. Consequently, we try to employ that metal for all possible purposes. (During the last war we even made nails of copper.) And so in my house, recently built, all conduit is made from copper tubing. It gives me no trouble at all.

FEDERICO STRASSER

Santiago, Chile

# Man Needs Rain Quick

Sir:

As a wheat farmer in this southwestern corner of Kansas, which is experiencing the driest weather on record, I read with extreme interest the article in your April issue entitled "Can We Make It Rain?"

With our once-promising wheat crop about dead, I am getting darn tired of gazing at heavily moisture-laden clouds that do not give us the needed rain. So I intend to try to make it rain in this locality.

I would, therefore, greatly appreciate your sending me sufficient information to enable me to construct a silver-iodide generator exactly like the one used by Project Circus in New Mexico.

HARRY B. TILLER

Satanta, Kansas

# INVENTORS

If you believe that you have an invention, you should find out how to protect it. The first step is to have a search made of the prior pertinent U. S. patents. If a report on this search indicates that the invention appears patentable you can apply for a patent, and the specifications and claims should be prepared.

The firm of McMorrow, Berman & Davidson, with offices in Washington, D. C., is qualified to take the necessary steps for you. We can make a preliminary search on your invention, advise you whether we think it can be patented, and prepare your application for patent.

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Send for a copy of our Patent Booklet entitled "How To Protect Your Invention," containing information about patent protection and patent procedure. Along with this we will also send you an "Invention Record" form, for your use in writing down and sketching details of your invention. We will mail them promptly. No obligation. They are yours for the asking.

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Project Cirrus makes silver-iodide smoke with a specially designed blowtorch having a valve that squirts silver-iodide solution into the flame. There are other ways, too-charcoal, soaked in a solution of silver iodide in acctone and then burned, works quite well. However, amateur seeding operations don't often make rain, mainly because only an expert knows just when and how to do the job. Amateur seeding may also disrupt controlled scientific tests of this technique, since wind can carry the silver-iodide particles many hundreds of miles.

# Utility vs. Eye Appeal

Sir:

It seems to me that the car designers have lost track of the prime function of an automobile—to provide a means of transportation. It's all right, I suppose, for the Paris dress salons to turn out merchandise with no other thought than eye appeal; but the cars now offered are loaded with supposed eye appeal at the expense of utility.

My first car, purchased in 1907, may have lacked some things now considered indispensable, but a mechanic could get at the works to fix them. If there had been any doors, they would have been designed solely as a means for getting into and out of the horseless carriage, instead of having to be a part of "flow lines".

It's time, I say, to call a halt to the senseless competition for spectacular lines and go back to planning cars for us common people who want to get places at a minimum of expense and a maximum of convenience.

W. P. SHEPHERD

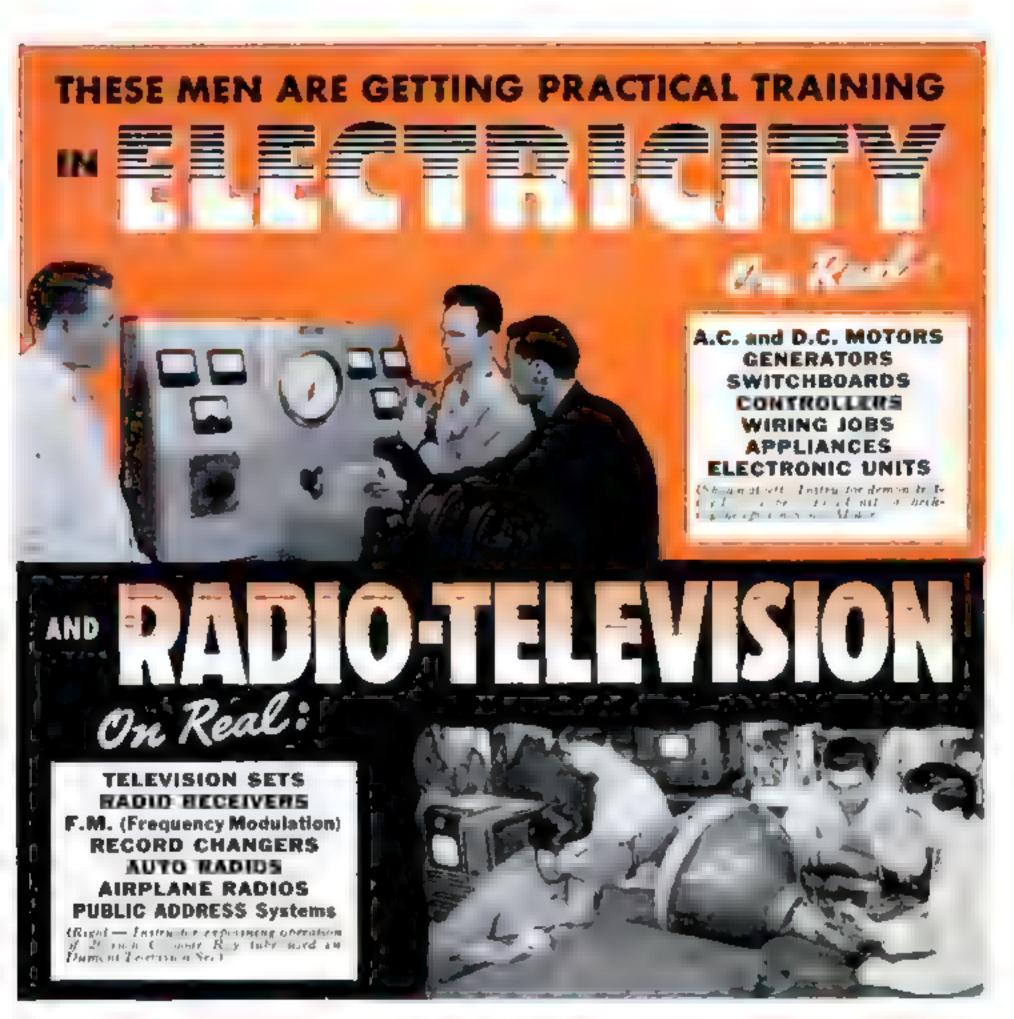
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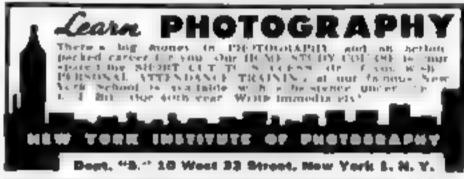
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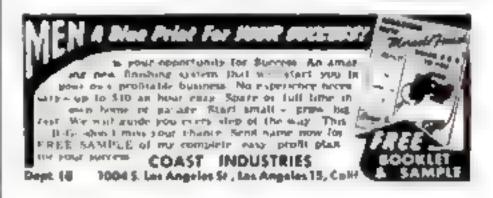
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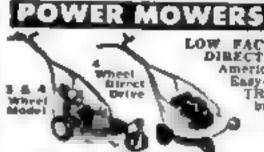


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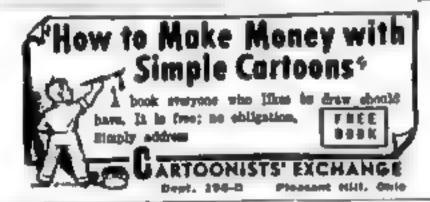


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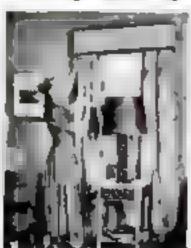
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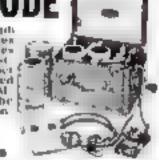
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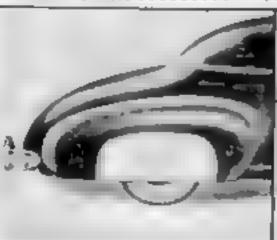
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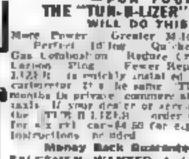
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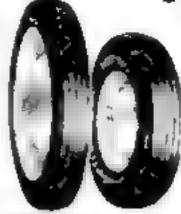


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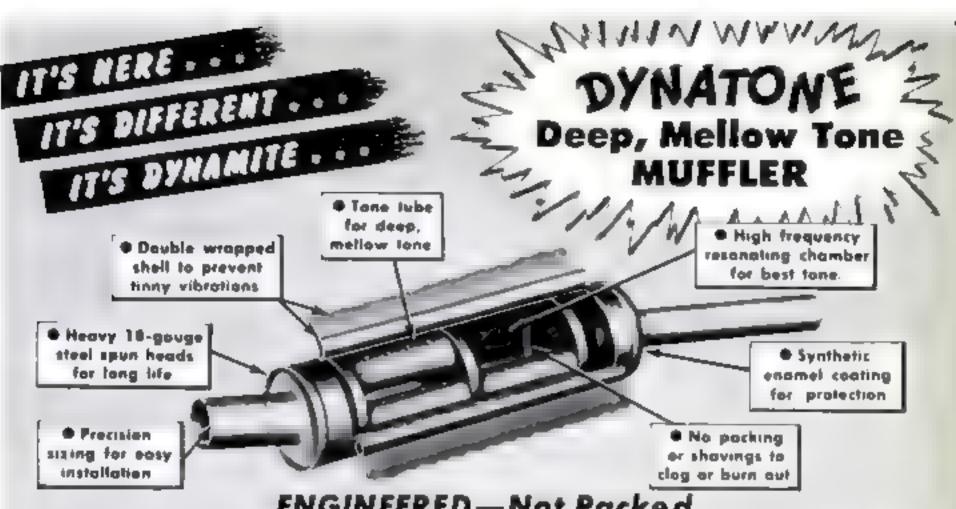
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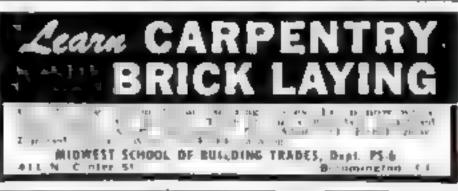
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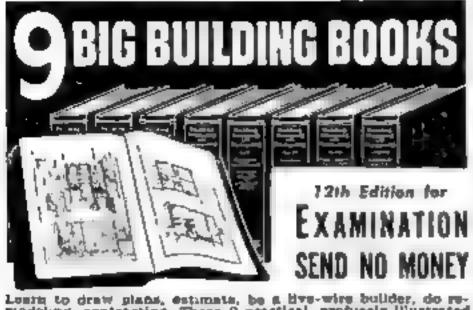
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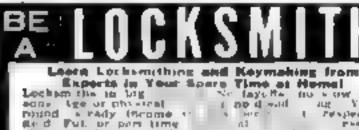


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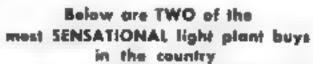


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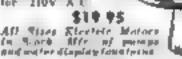
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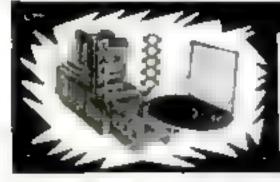


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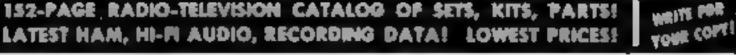
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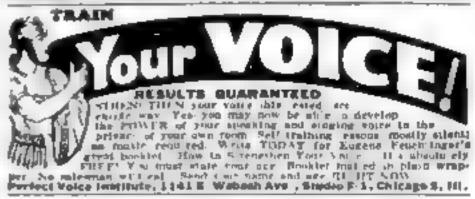
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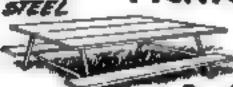
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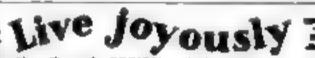
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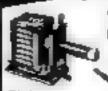
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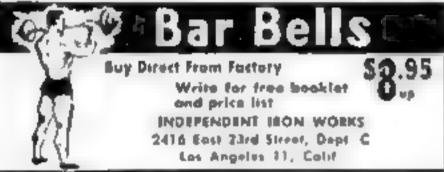
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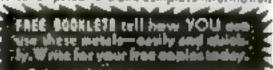
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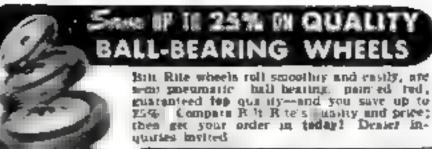
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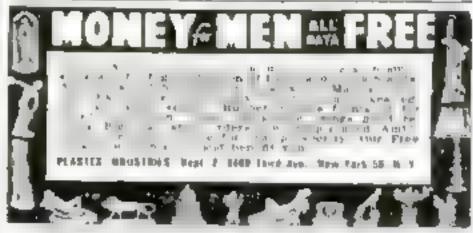
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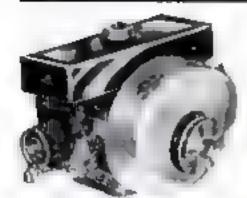
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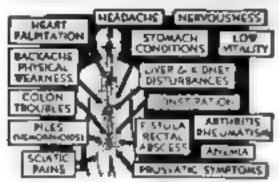
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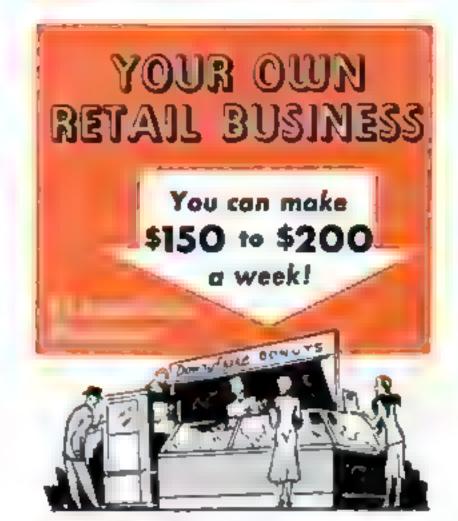












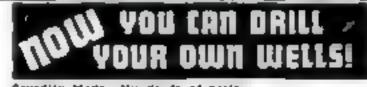
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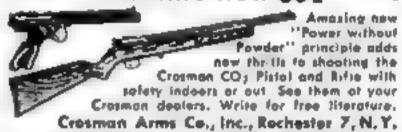




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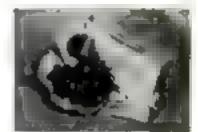
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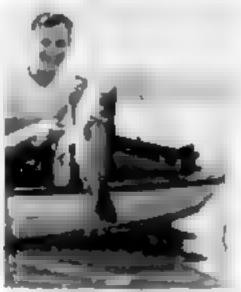
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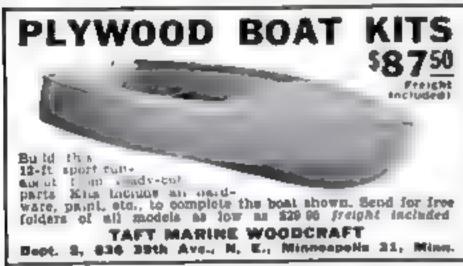
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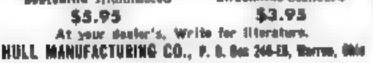


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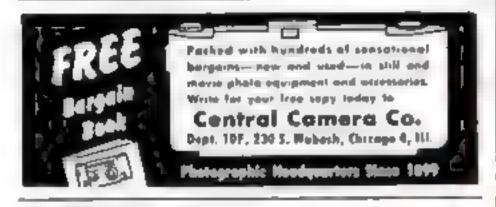
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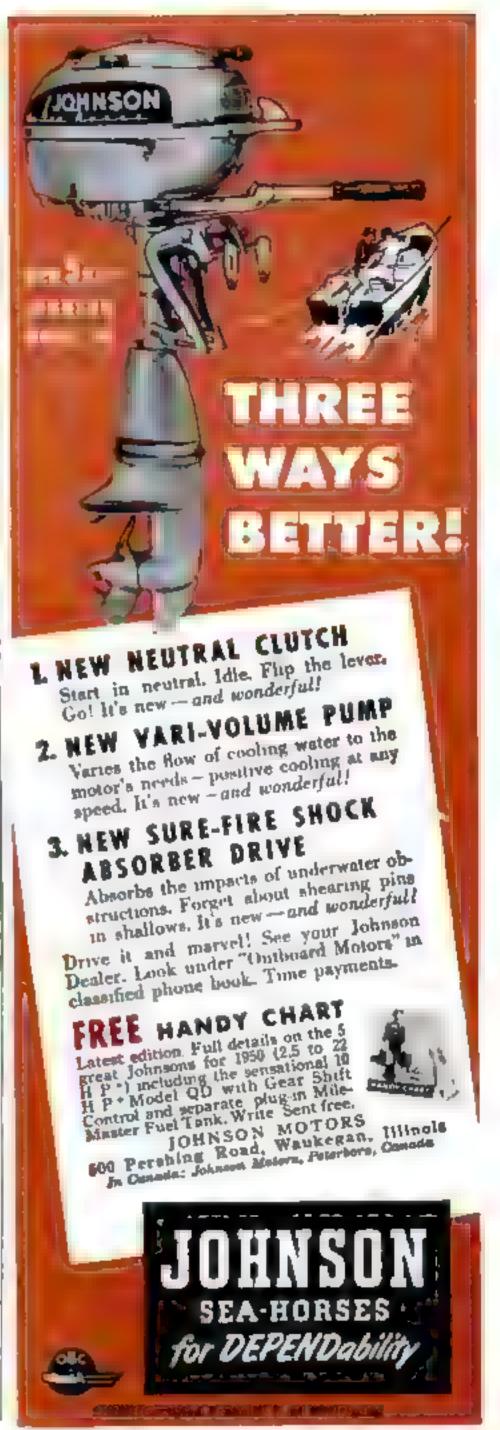
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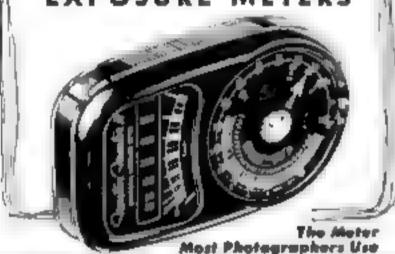
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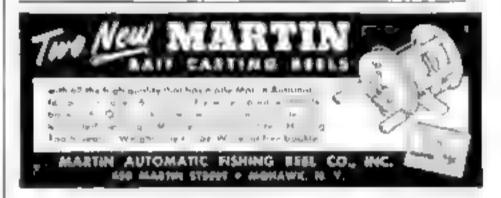
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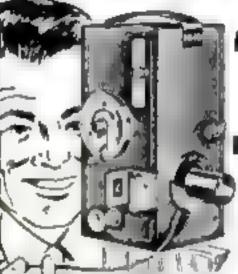
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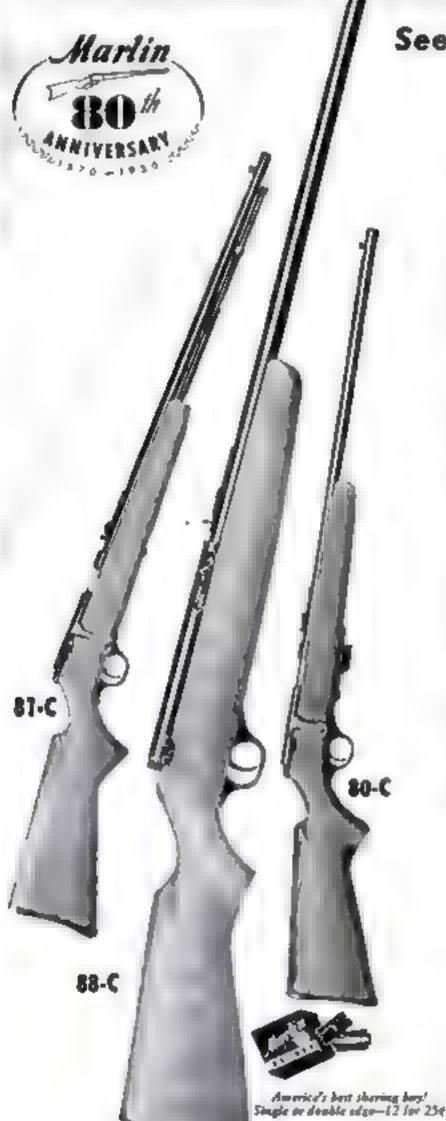
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See these great .22 repeaters by

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Look at these big-value beauties! Each is a marvel of modern production methods. Each is traditionally sturdy, safe and dependable. Man-size, handsome fire-arms. precested for performance at the factory—these Marlin Rifles give you years of sport and utility at nominal cost. See them today!

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16-25 shot subular magazine repeater. Shoots .22 short or long rifle regular and high speed. Crusp trigger action—self-cocking side ejection—positive safety—Seasoned Walnut stock, Rocky Mr. rear sight - Bead front hight. Also available with hooded samp front hight, peep sight, swivels; at slightly higher cost. A honey for hunting and all around sport! \$27.15°

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Smooth, rapid, automatic action; independent safety. Lightuing-fast firing of .22 long rifle ammunition, regular and high speed. Pourive safety-loads through and of buttstock. Foulproof. Hooded ramp front hight, Rocky Mt. rear sight. Seasoned Walnut Stock. \$29.95°

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8-shot clip magazine repeater. Shoots .22 short or long rifleregular and high speed. Sharp, responsive action—side ejection positive safety—Seasoned Walnut mock. Rocky Mt. rear eight Bend front night. Also available with hooded ramp front night, peep night, rwivels; at slightly higher cost. Ideal for small game. \$22.30°

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## The Marlin Firearms Company

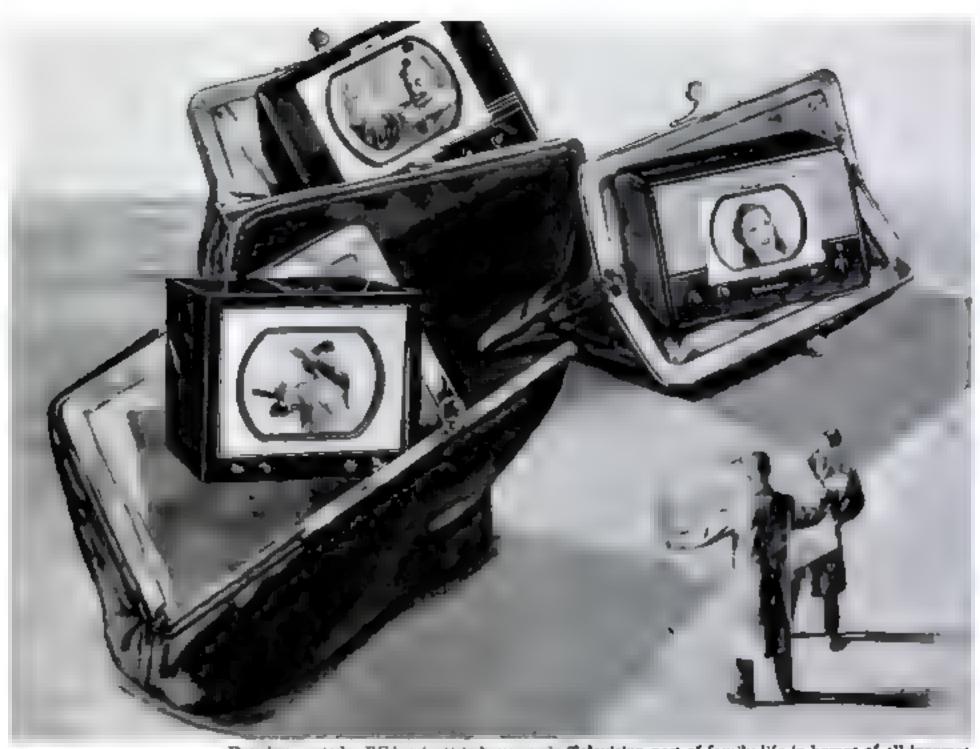
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Developments by RCA scientists have made Television part of family life in homes of all incomes.

## How research fits television into more purses

Remember when television was "just around the corner," and guesses at receiver cost ranged to thousands of dollars? Came reality, and pessimists were wrong. Home television sets were reasonable, have grown more so year by year.

One factor has been research at RCA Laboratories. In 1949, RCA scientists perfected the glass-and-metal picture tube—so adaptable to mass production that savings of 30% in tube cost were made. Again, these scientists and development engineers learned

how to replace complex parts with less costly, and more efficient materials. A third contribution was the use of versatile multiple-purpose tubes—so that one could do the work of several!

Most important, the savings effected by RCA scientists have been quickly passed on to you, the consumer, RCA Laboratories is a great center of radio, television, and electronic research. It is indeed an institution which fits RCA products into more purses!

See the latest in radio, television, and electronics at RCA Exhibition Hall, 36 West 49th Street, N. Y. Admission is free, Radio Corporation of America, RCA Building, Radio City, N. Y.

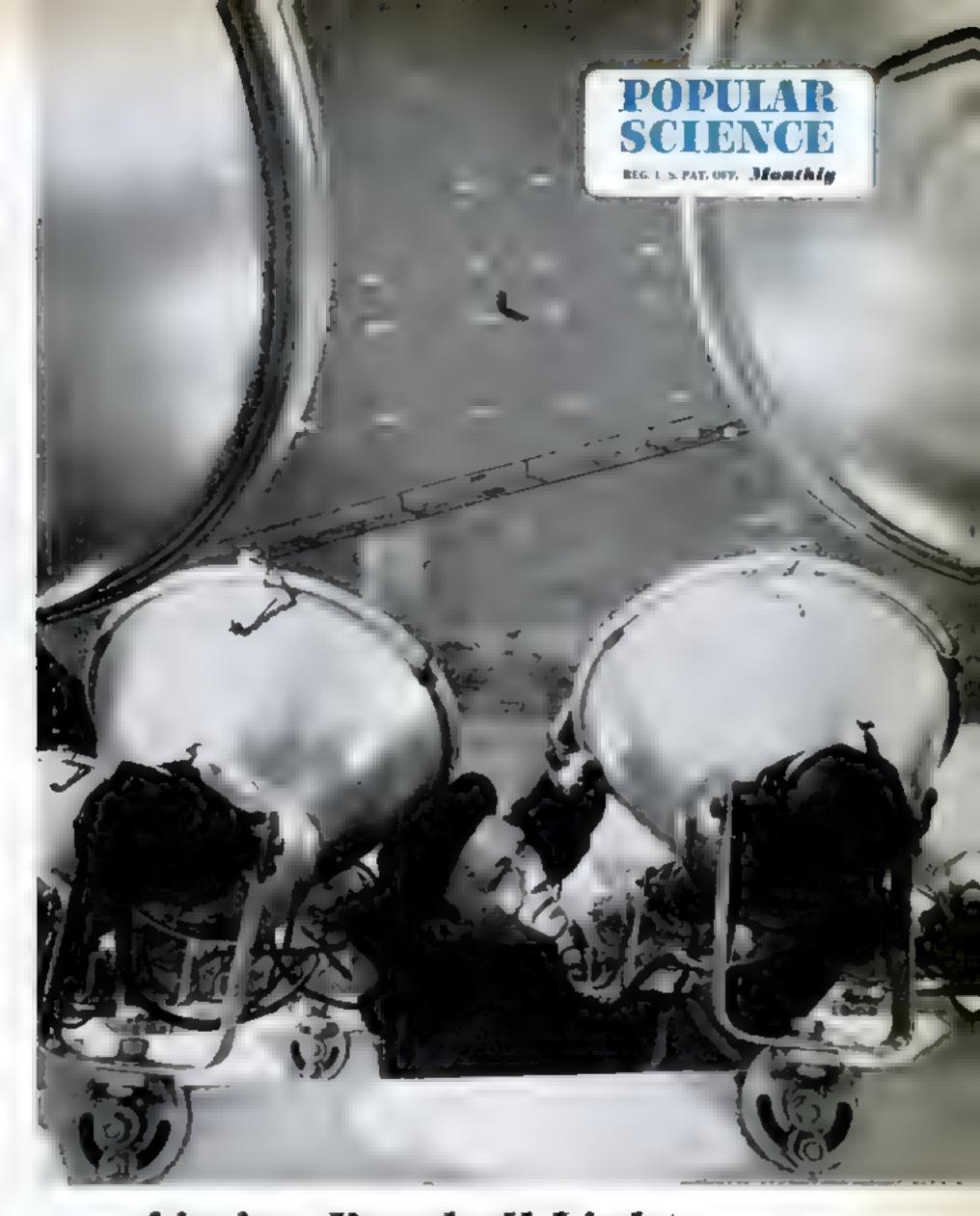


New RCA Victor 16-inch home television receiver, a leader in the 1950 line.



RADIO CORPORATION of AMERICA

World Leader in Radio - First in Television



# land's Municipal Stadaum, where the Indians will play 24 right baseball games this season, a new lighting system virtually doubles former illumination. How Westinghouse engineers adjusted its 1,318 floodlights for maximum effectiveness is shown above. First they laid numbered disks on the field, at precalculated positions. Each disk served as a target for a 1,500-watt light such as the engineer is seen aiming. Clustered in two and threes, targets—these are on the right-field grass—are visible as small white dots.

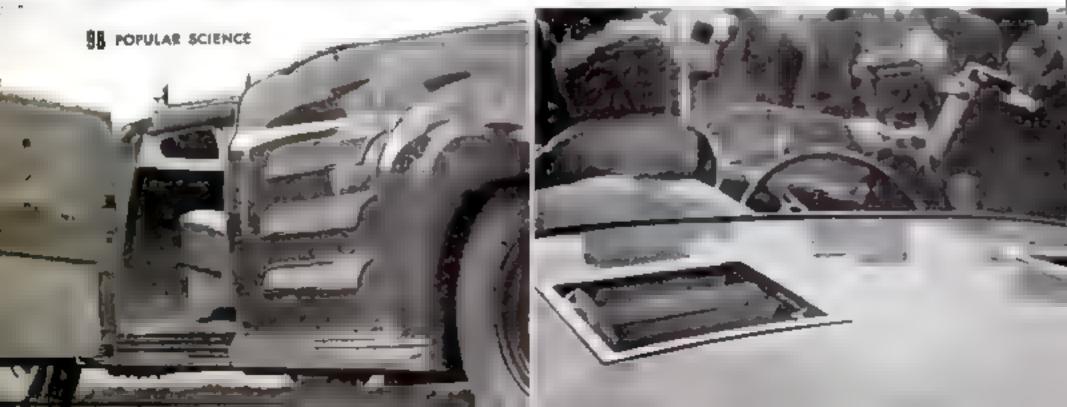


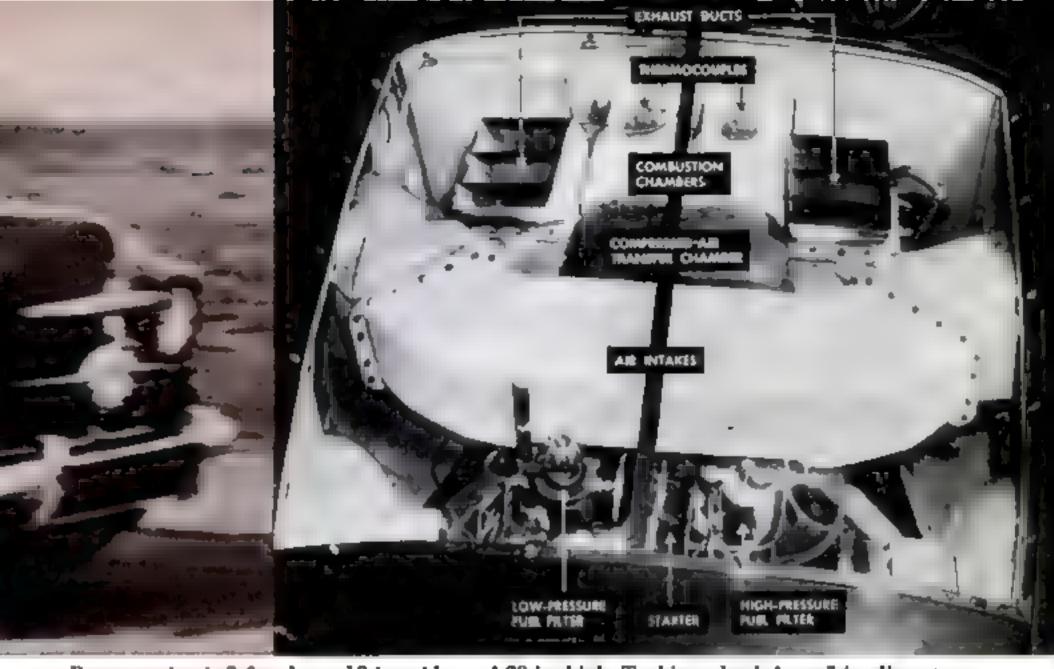
Can the aircraft wonder engine earn a place on the highway? Both U. S. and British engineers think so.

NORTH of London, the other day, they tested out a brand new kind of automobile. It had no pistons and no cylinders. It had no carburetor. It had no crankshaft.

Air intakes handle ten times amount of air required by paston engine of comparable power. Compressor mass this into combustion chambers at pressure of about 45 lb. per square inch.

Exhaust issues at 100 m.p.h. It has no jet effect on propulsion. Windshield in top photo is replaced here with small windscreens. This photo and one at left are from Mechanics. London.





Rover engine is 3 feet long, 18 in. wide, and 20 in. high. Turbine wheels have 5-in. diameter.

# Turbo Cars?

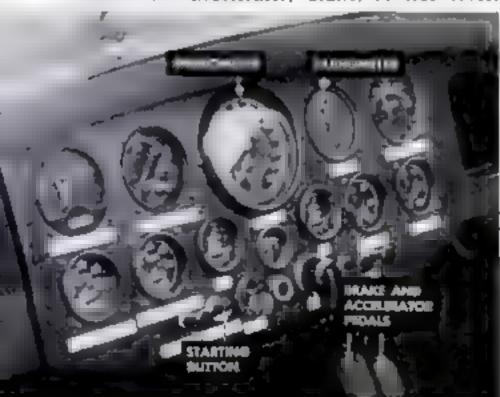
By Devon Francis

It had no clutch pedal, distributor, valves, radiator, or transmission. It had none of those conventional pulsing exhaust noises.

But it had performance.

It accelerated from a standing start to 60

Instruments on dash are largely for testing. Dials on production model would report compressor and oil pressures, compressor speed. Controls are accelerator, brake, reverse lever.



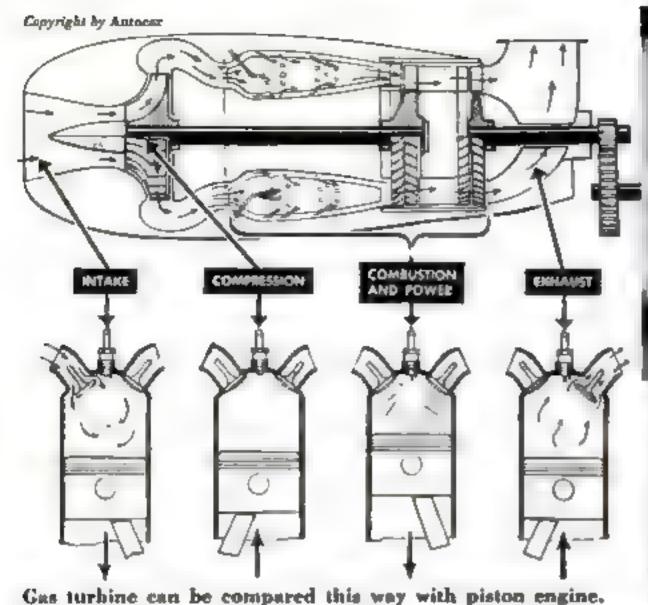
miles an hour in 14 seconds. It streaked up to 90 miles are hour with no apparent effort, and easily could have bettered 100. If it tended to "creep" at a standstill, a light pressure on the brake pedal would hold it stationary. The car had practically no vibration, moving or standing still.

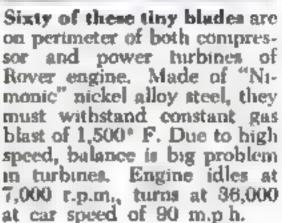
Outwardly, it looked like a standard British-produced open car with the rear seat blocked off to accommodate an extralong turtleback. It did smell of kerosene that lowly product of crude oil—and that

was the Himself.

By coincidence, at the same hour, almost 6,000 miles away in Seattle, Wash., a 10-ton truck was crussing the highways under the thrust of a kind of engine that was brand new to truck wranglers. The weight of the engine was less than a twelfth of that of a Diesel of comparable power. It occupied less than a tenth of the space that would

JUNE 1950 99





have been taken up by a Diesel or gasoline engine and its accessories. It had only a tenth as many parts.

The truck, too, had a faint kerosene odor. For the British automobile and the American truck had this in common: they were the world's first highway vehicles powered by gas turbines. They had engines that were close relatives of the engines that drive today's ultrafast fighter planes, some of the newest bombers, and that spectacular new British airliner, the Comet (PS, May '50, p. 98).

Boeing compressor, shown below with one of two turbines in engine, pumps air to combustion chambers at three times atmospheric pressure. Engine has diameter of 22 in. and is 42 in, long Contrary to newspaper accounts, this new automobile and new truck were not jet-propelled. They were not moved by a hot tailpipe blast. Instead, their turbines produced shaft power to drive the rear wheels.

Their turbines at full power whirred at an incredible speed for heat engines—from 36,000 to 40,000 revolutions a minute. In fact, that was three or four times as fast as current aircraft turbines.

The car and the truck represent the first basic change in automotive power plants since the invention of the internal combus-

Cutaway of Boeing engine shows compactness It has an electric starter, 2 igniter glow plugs. Fuel system consists of pump, governor, spray nozzles. Top fuel pressure is 400 lbs. per sq. in.



tion engine in the 19th Century. The car was designed and built by the Rover Company, Ltd., of Birmingham, England, as a "test bed" for road turbines (PS, Sept. '48, p. 138). The truck was powered by an engine designed and built experimentally by the Boeing Airplane Co., of Seattle, maker of the Stratojet, the world's fastest bomber.

The car and truck may bring a complete revolution in automotive power and design

in the next five years—or less.

They may. No one knows just yet. There is a score of problems to be solved before the man on Main Street can walk into an

automobile showroom and order the turbine job with the chrome exhaust ports. Or the truck fleet owner can buy mechanical horses so compactly packaged that he can tote five to seven tons more cargo without increasing the length of his combo.

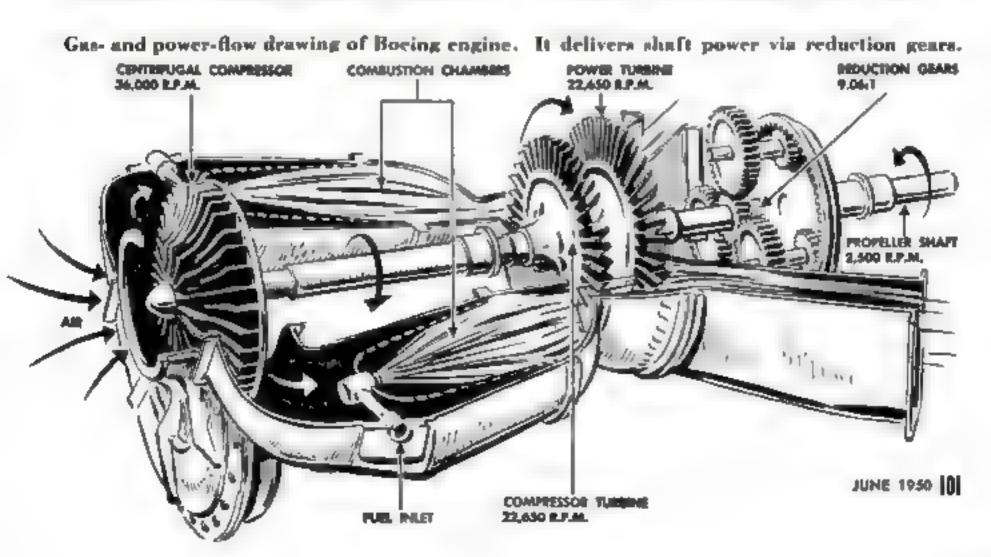
But those who have followed the progress of Rover and Boeing during the last couple of years are convinced that the day of turbine propulsion for passenger cars, trucks, and buses is almost a reality.

It wouldn't be surprising. The gas turbine as a replacement for the piston engine in aircraft is just coming into its own. The



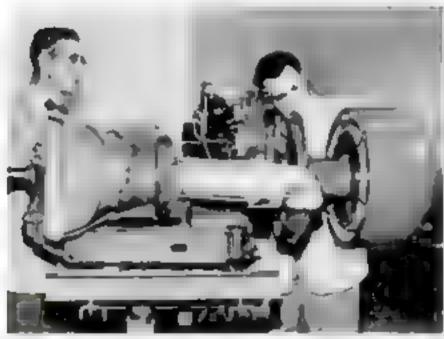
Turbine engine in truck is almost lost in chassis compared with Diesel at right. Vertical stack

at far left (arrow) is one of two for exhaust. Truck was made by Kenworth Motor Truck Corp.



gas turbine as a shaft-power unit for propeller-driven aircraft will be flying the oceans as a "turboprop" in a couple of years. Both the steam turbine and the gas turbine have been adapted to railway locomotives, Turbines are an old story to ocean vessels. It's about time that rubber-tired vehicles got a crack at the turbine.

Like any gas turbines, the ones in the Rover and Boeing-powered truck are vastly



Boeing engineers have succeeded in silencing normal whine and roar of gas turbine through big muffler at far right. Turbine has been under development for U. S. Navy Bureau of Ships.

simpler than a piston engine. Substantially, they have only six parts—a compressor, two chambers to burn the fuel, a turbine to drive the compressor, another turbine to develop shaft-power, and two shafts. Three or four main bearings will take all the load of a turbine engine. There are no other bearings in the engine proper. There are no reciprocating parts. No pistons jump up and down. Moving parts rotate like an old-fashioned waterwheel

The engine has only two "cylinders." In this instance the "cylinders" are a couple of containers where kerosene is burned as simply as in an oil heater. The compressor does the same job as the piston on the compression stroke of a reciprocating engine—it compresses air. Any engine must have a lot of air to burn its fuel, and gas turbines must have an extraordinary amount of air. They are pigs for air

The power turbine is the gimmick, the key to the whole operation. The gases that have driven tornado-like through the compressor turbine attack the power turbine and spin it too. That produces shaft-power. Once you've got shaft-power, you can move something. Gear down the Rover and Boe-

ing power-shafts, and you've got torque for the rubber on the road.

It's no more complicated than that. The automotive turbine differs from an aircraft turbine in that it has two shafts. An aircraft turbine engine has only one. The reason for that is the same reason that a conventional automobile has a way of disengaging the engine from the rear wheels. If the automotive turbines were permanently geared to the rear wheels, it would stop every time the car stopped. So that second shaft, the power-shaft, is motionless when the car is at rest. Like the propeller shaft in a conventional car, it is in constant gear with the wheels. The shaft on which the compressor and the compressor's turbine turn isn't. It keeps going, whether the car is in motion or not. The power shaft delivers power as the driver needs it.

The power turbine revolves at a speed dictated by two conditions: the load on the engine and the amount of energy fed to it by the compressor. The speed of the compressor depends on the amount of fuel fed to the burning chambers. On a hill, the turbine, assailed by an inferno of gases, twists harder. In one sense, when the car hits smooth sailing on a straightaway the turbine becomes a "fluid" coupling between the



Within this quartz jacket, gas-turbine combustion is under study. Boring engineer observes how and where burning occurs. Research is resulting in lower fuel consumption, higher power.

compressor and the wheels.

All that's on the plus side. So is quick starting, characteristic of the turbine engine. It will roll without a whimper at 65° below zero. It doesn't cough or die under load.

On the plus side too are the absence of a continuously operating ignition system, and the turbine's smaller size. Fitted with tur-

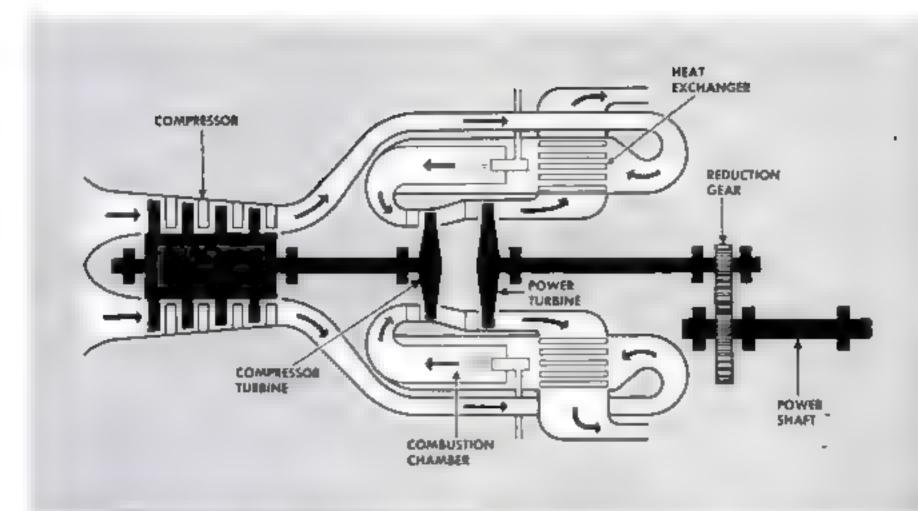


Diagram by R. H. H. Barr, British engineer, indicates how heat exchanger can be adapted to a gas-turbine engine. Power Jets, Ltd., of Lon-

don, pioneer in gas-turbine research for propulsion of road vehicles, holds copyright on drawing and concept of this type of engine.

bines, today's cars could be lowered several inches. Hoods could be shorter, increasing road visibility. Cars could be aerodynamically cleaner. There is no radiator to propel against the air.

The turbo car (as they are dubbing it here in England) can have a much lighter chassis without sacrifice of strength because the engine is light. That would boost fuel mileage. Moreover, it burns cheap fuel. A turbine will run on almost anything short of firewood. For railway use, they are even experimenting with powdered coal. Boeing proposes using natural gas.

Finally, sheer simplicity should make a turbo car's or turbo truck's maintenance costs considerably below those on a piston vehicle. Removing the Boeing turbine engine, dismantling it, inspecting it, reassembling it, and putting it back in the chassis is a job for one man—in just six hours. He doesn't even need a chain hoist.

Gas turbines supply extra dividends. The turbine-powered passenger car or truck doesn't need a special heater to keep its human cargo warm in frigid weather. Heat can be bled off the compressor at will.

All this sounds too good to be true. There has to be a catch somewhere. Actually, there are a good many of them. The biggest drawback to the gas turbine for road vehicles is that it does its best at near-maximum r.p.m. It falls down in its power

delivery at low speeds, or part-load, as the engineers say. And automobiles, trucks, and buses operate a lot more at part-load than they do at full load. The cure for this ailment may be a transmission, the same device that piston engines use to overcome their problem of low torque at low speeds.

Gas turbines are notorious for low fuel mileage. They develop a lot of heat but they waste too much of it. The Rover's engine, rated at 200 brake horsepower, gets around six miles to the gallon of kerosene. Using kerosene, the Boeing turbine, rated at 175 hp., is three and a half times more expensive to run than a Diesel.

There is a reason for that. It goes right back to that voracious appetite of a gas turbine for air. In a piston engine about 4,500° F. is developed in a cylinder head at the instant of fuel explosion, the start of the power stroke. The engine metals can stand this only because the explosions are intermittent. Water jackets, air, and oil keep carrying away the heat.

In a gas turbine there is continuous burning of fuel at about 3,500° F. There must be a great extra volume of air to cool the gas down to 1,500° before it is fed to the special-alloy turbines, so the metals can take it. That's where the loss occurs—most of the energy developed in burning the fuel to get gas volume and velocity to turn the power turbine is expended in turning the air com-

pressor. The engine produces shaft-power

as a sort of afterthought.

The ultimate solution to better efficiency is better metals. The metallurgists are working on that one. Gas turbines will have to do a lot better in passenger cars before the crossroads of Great Britain and America grow forests of kerosene pumps. It may be another story on gas-turbine trucks, though. Fuel costs in trucking are the least of the operator's wornes.

#### Preheaters May Help

Heat exchangers, transferring heat from burned gases to incoming air, will help fuel mileage. Preheating the air before it is burned may double the fuel mileage. That merely means better combustion, like getting a better draft in a fireplace.

There are other stoppers for the present. High engine speeds pose problems of exact balance or possible bearing overloads. Then, too, gas turbines don't do as well in summer heat as they do in the winter; the compressor can't bite thin, hot air as well.

For the first two or three seconds, acceleration from a dead stop is poor on the Rover. The engine is sluggish initially because it takes time to get the power turbine up to speed. But once it starts rolling, it goes. The jump from 10,000 r.p.m. to 15,000 takes just three seconds. Boeing

smartly put a gearbox in its job. The truck's acceleration leaves nothing to be desired.

Noise in the automotive gas turbine can be another problem. The Rover car hisses and whines. On sudden acceleration it roars. The noise comes from air intakes, compressor vanes, reduction gearing, and exhausts. Filters, insulation, and muffling may reduce the decibel level of turbo cars to that of piston-driven vehicles. Boeing has succeeded in reducing the noise level to less than that of piston-driven trucks.

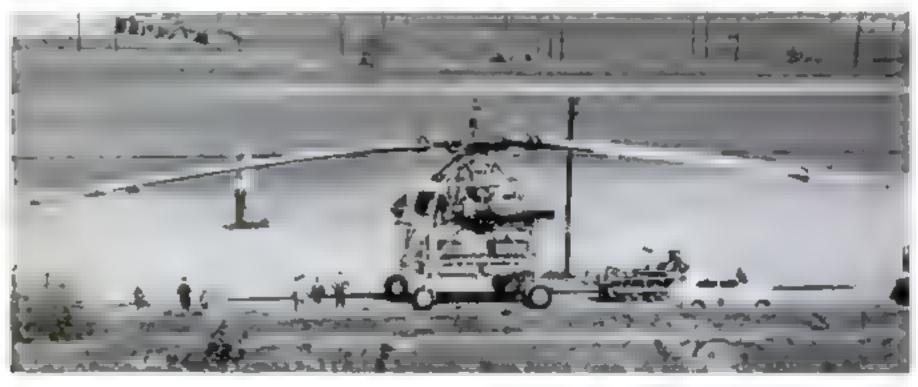
Boeing, too, has whipped the problem of getting engine-assisted braking in going

downhill. So far, Rover hasn't.

#### Says Turbos Are Coming

But no less an expert than England's leading lay authority on the gas turbine. G. Geoffrey Smith, editorial director of Autocar, and the first man ever to drive a gas-turbine car 90 m.p.h., says, "The Rover in performance already compares favorably with the modern piston-engine automobile—which has 50 years of experience behind it. I don't say the turbo car is here yet as a salable article. But it's coming. It's bound to."

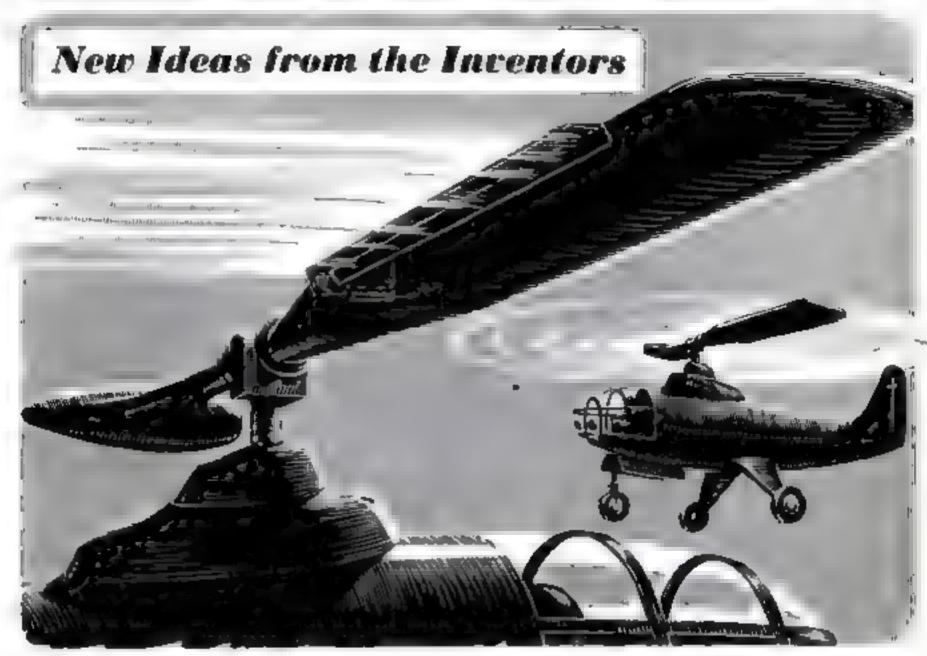
So it may well be that presently you will roll up to a service-station pump and say, "Ten, please-of the lowest octane you've got."



#### Glant 'Copter to Lift Tank

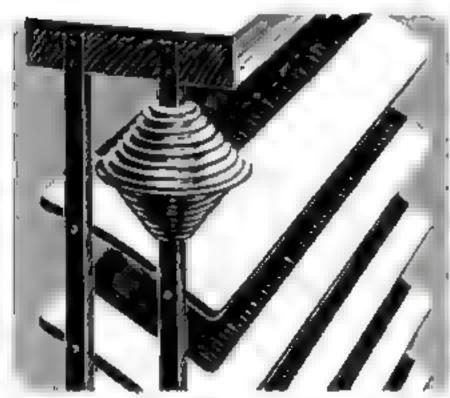
This is a nonflying early model of the "Flying Crane," one of the world's two largest helicopters. Being developed by the Hughes Aircraft Co., for joint use of the Anny and Air Force, the XH-17 would be used to lift and ferry heavy equipment, such as tanks, trucks, and bridge sections, across

mountains and other inaccessible terrain. The huge craft is powered by a unique combination of turbojet and ramjet. Two J-35 turbojet engines, mounted on the fuse-lage, send blasts of compressed air to the tips of the 136-ft. rotor blade. At the tips, the air is mixed with fuel and burned in small ramjet engines, creating a thrust that rotates the blade like a pinwheel.



1 One Blade to Lift 'Copter. A jet-propelled blade, driven by compressed gas from a free-piston generator mounted in a housing that serves to counterbalance the blade, powers this helicopter.

Because the propulsion unit is confined entirely within the rotor, the problem of reactive torque is eliminated. The generator is similar to that designed for gas-turbine locomotives (PS, Nov. '48, p. 98).



2 Sun to Operate Blinds. Venetian blinds fitted with this thermal control system would open and close automatically according to the heat from the sun's rays. When warmed above a predetermined temperature, the gas-filled control unit expands and closes the blind's pivoted slats. On cooling, it opens them.

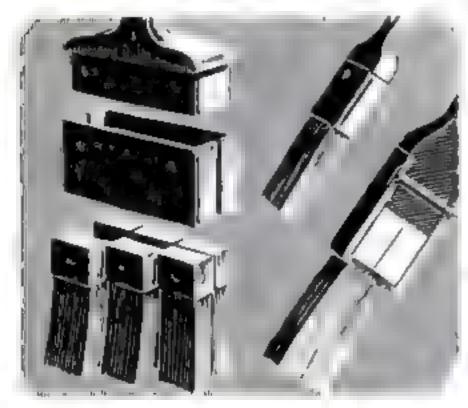


3 Hat to Have P. A. System. Policemen handling traffic jams at ball games and similar gatherings would be able to save their voices with this helmet. It carries its own lightweight loudspeaker powered by a portable amplifier. The microphone can be either the hand-held type or the more compact throat variety.

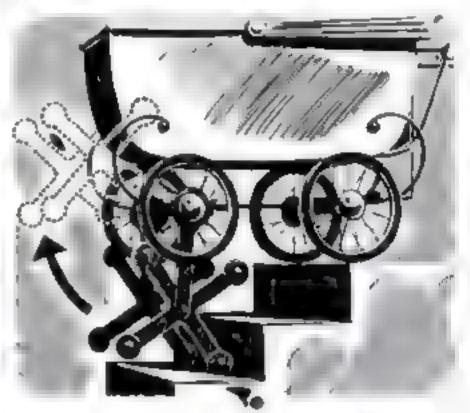


4 Trailer to Fit in Car. Designed to fit into the existing luggage space in a car, this trailer would simply be pulled out when needed. Also, since it is constructed to telescope, its capacity could be

adjusted, within limits, to fit the size of the load to be moved. The rubber-tired caster wheel, on which the rear of the trailer rides when it is extended, folds up out of the way when the trailer is not being used.



5 Brush to Be Sectional. A paint-brush could be made up to fit the job with these bristle units—one unit for a small brush, two for a medium-sized brush, or six for a large brush. Because the bristle units could be removed from the handle and be completely immersed in solvent, cleaning after use would be simplified.



6 Carriage to Climb Stairs. Shown on a baby carriage, this device is designed to make it easy to move any similar wheeled cart or dolly up or down steps. When down in place, four rotating, roller-tipped spokes support the front end on the step below, "walking" up or down to the next step as the cart is moved.

Patents on these investions have been granted to:\$1. J. Lee, Fernington, Conn., 2 J. Grebe, Midland, Mich., 3. G. Eath, Tolade, Ohio; 4. D. Brand, Johannesburg, South Africa; 5. P. Riccharle, Chicago; 6. A. Pascon, New York City.

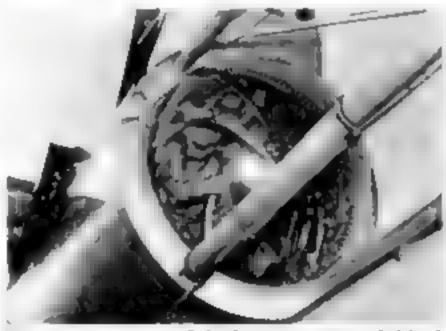


Fuel-transfer boom is a rigid, telescopic, hollow shaft. Support structure is hinged to tanker's

tail. Black strip visible on inner edge of the U-shaped ruddevator above is the electric de-icer.

## De-Icers Protect Refueling Boom

CONTROL surfaces on the Flying Boom, designed for refueling in mid-air, are equipped with novel de-icers, made of rubber in which heated wires are imbedded. The rubber de-icing boots edge the V-shaped controls, called "ruddevators," used by an operator in a tanker plane to "fly" the boom to the plane to be refueled. The photos on this page show details of the boom recently released by Boeing, who developed it to increase the range of warplanes.



Here is a closeup of the boom operator, dubbed "Clancy" by Boeing Airplane Co, test pilots. By manipulating ruddevators, he "flies" boom into position for coupling the tanker and bomber.



View from tanker shows boom being lowered into position for delivering fuel. Operator's station is in same space normally occupied by tail gunner and armament in B-29s used during war.



Contact has been made and fuel is being transferred. Boom connects to bomber's intake line through slip-away doors just back of nose. Tanker flies above and in front of other plane.

# You'll Get COLOR Think Sooner than You Think

RCA's new tri-color tube mixes all three colors electronically—without lenses, disks, or mirrors.

By John F. Loosbrock

Drawings by Morris Cohen.

THANKS to a new tri-color tube, color TV has moved much closer to your living room. Maybe you'll even find a set under your 1951 Christmas tree. And the pictures will compare in quality with the best you can get on your black and white set, with the dividend of glowing color.

The bottleneck breaker is a new viewing tube, developed by RCA, that puts the colors back together after the color camera has torn them apart. And it does this electronically, without mirrors, lenses, or disks.

At present, there are two versions of the new tube. One uses three electron guns to paint the colors on the screen. The other uses one. Both employ a viewing screen coated with rows of small, closely spaced phosphor dots. These are arranged in triangular groups of three. Each triangle contains a dot that glows red, when hit by an electron stream, a dot that glows blue, and a dot that glows green. The hand-made models used in recent tests before the Federal Communications Commission in Washington had \$51,000 such dots, \$117,000 of each color.

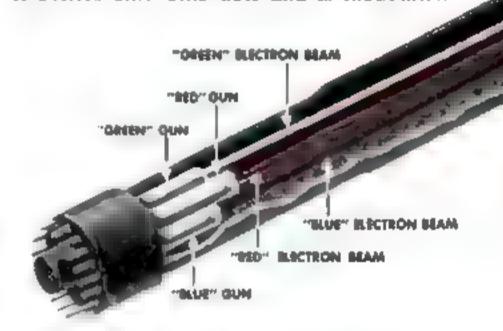
The tube that looked best during the tests uses three electron guns mounted in the tube neck—one for each of the three primary TV colors. Between the guns and the screen is a metal mask having 117,000 tiny holes, one for each group of dots.

The three guns are so mounted in relation to the mask that the electron stream from each gun strikes only the dot emitting the particular color that the gun is painting. Thus, the red gun can hit only the red dot. the blue gun the blue dot, and so on.

The second version uses essentially the

same principle. The mask and the dot groups are identical. But it works with a single electron gun. Its beam is rotated magnetically so that it occupies, in sequence, the positions of the three guns in the threegun kinescope

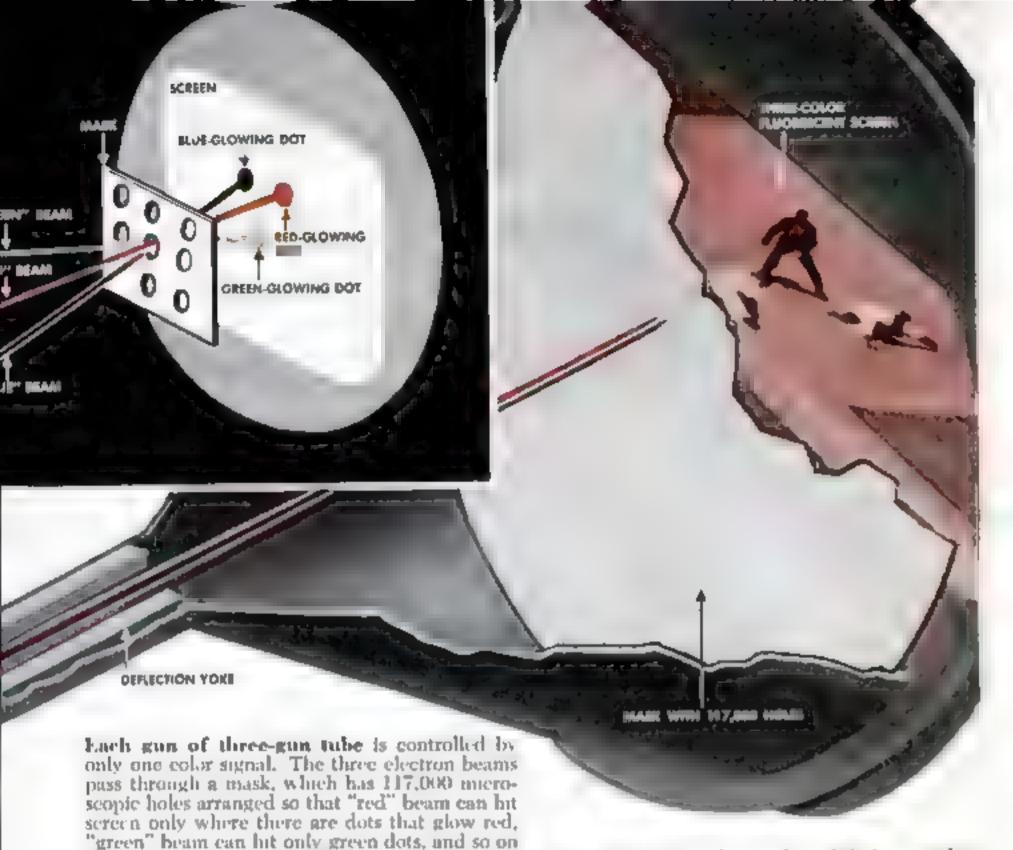
Thus when the beam is in a position corresponding to the red gun of the three-gun tube, it is modulated only by the red component of the video signal, and strikes only the red phosphor dots. A tiny fraction of a second later, it is rotated to a position where it excites only blue dots and is modulated



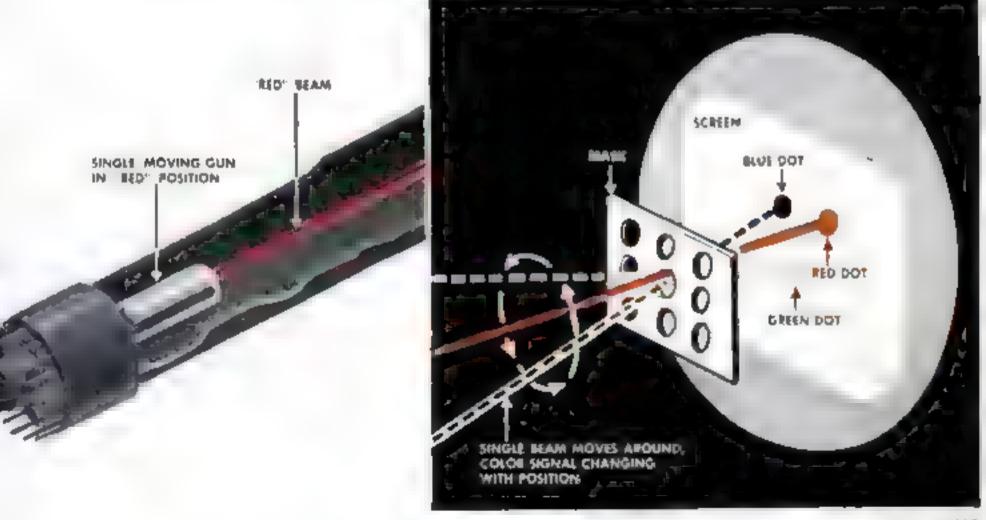
only by the blue component of the signal. The third position produces green. You see all three at once.

The pictures look good. I saw the new tube demonstrated in Washington. The colors were true and the pictures clear—at least as good as the best black and white picture, and you can't expect to do better with TV confined in its present bands.

Why is the tri-color single tube so important? It's because the most controversial part of the color TV problem to date has been that of putting the colors together for your eyes. As you've probably read, the color question is the nub of a hot controversy that the FCC must settle, one way or another, in the near future. Three warring systems have been beating the drums for their own particular product—RCA,



In one-gun tube dots and mask holes are identical with three-gun job. But electron beam is rotated magnetically, changing "color" with pasition so one gon can do saise work as three.

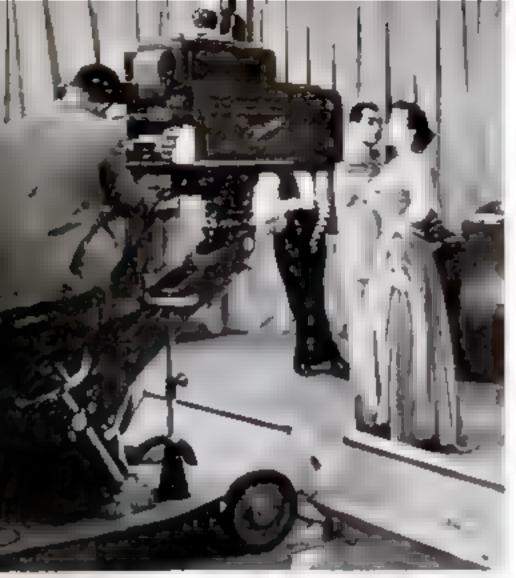


(see inset above). Individual colored dots, too

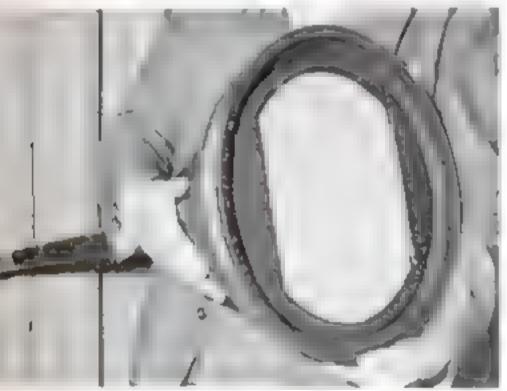
tiny to be picked out by himan eye fase to-

gether like dots in color engraying to give ini-

pression of sar oth, continuous color picture



RCA's tri-color camera picks up telecast from station WNBW in Washington during demonstration of new RCA color tubes before the Federal Communications Commussion



The one-gun, tre-color tube looks like the lift Vergreets rework is on a recolor distance with more dots. Tube can be used in some standard receivers, but needs extra circuits

Close-up shows neck of three-gan tube It fits into standard RCA receiver heef deep with 19 more tubes for color synchronization, sampling, and additional power supplies.



Columbia, and Color Television, Inc.
Here's how the three systems differ:

RCA. The camera directs red, blue, and green light from the subject into three different lenses. It does this with "dichroic" mirrors, each of which reflects only one color. Individual scanning tubes translate each image into signals for transmission.

In the receiver, RCA now uses the tricolor tube. In earlier tests it employed three tubes and a nurror system to put the

colors back together on a screen.

CBS. The color camera uses a mechanical device—a whirling disk divided into primary-color segments. This rotates behind the camera lens and filters the light so that the colors pass through in succession.

At the receiver CBS puts the images together in black-and-white on a screen. In front of this another color disk, synchronized with the one in the camera, colors the images. Recently, however, CBS demonstrated an all-electronic receiver that eliminates the often-criticized mechanical wheel. It projects a big picture with a lens-andtube system like CTI's (see below).

CTI. Like RCA it uses three lenses, with a dichroic-mirror setup to separate the colors. But these produce three small, separate images on the scanning tube face. Successive lines of red, blue, and green are then transmitted from the three images.

The CTI receiver uses a single tube, on which the three color images appear, greatly reduced and side by side. Another lens sys-

tem magnifies and projects them.

One important virtue of the new RCA receiver tube is that it can be used with any of the three systems.

It eliminates the registry problem inherent in the projection systems used by RCA and CTI and now adopted by CBS. Or it could replace CBS's receiver disk, with its mechanical, size, and noise problems.

Each system has its own advantages and disadvantages, both in picture quality and in its effect on the some 5,000,000 persons who now own black and white sets. Let's take a critical look at all three, as I did.

CBS leads the parade in color quality, especially in the critical skin tones. Dr. Peter Goldmark of CBS, who started the color whirl back in 1940, says this is due to his "field sequential" system, which shows complete pictures in each color in rapid succession. But to get this, CBS must forego "compatibility." That means you can't watch a CBS color picture even in black

III POPULAR SCIENCE

and white on your present set. To squeeze its signal into the six-megacycle band allotted to color TV, CBS had to cut down its picture lines from 525 (the black-and-white

standard) to 405.

If you're willing to settle for black-and-white pictures of color programs, you could get a converter for an estimated \$15 to \$25. Conversion of your set to receive color would run around \$75. New color sets would cost somewhat more than present black-and-white prices. CBS claims that its system is the cheapest, and the only one that could begin color broadcasting now.

For RCA, the big advantage claimed is that it's compatible, since it uses a 525-line picture, so that you can see a color broadcast in black and white with your present set. But even with the new tube, the colors are colder and skin tones are darker than those obtained by CBS. Initial cost of converting your present set will probably cost more than CBS, although RCA experts have made no forecasts. David Samoff of RCA says new color sets will probably run around 20 to 25 percent more than comparable black-and-white jobs. This presumes quantity production, which RCA says will take one to two years. RCA breaks each line into "dot sequential" system.

CTI is all-electronic and compatible. But it uses a "line sequential" system. Each line in the picture is alternately red, blue, and green. Overlapping creates the full-color illusion. However, the Washington tests I witnessed weren't good. Colors weren't true, nor were they in register.

#### FCC Must Decide

Since the RCA single tube licks the receiving problems of all three systems, it's bound to bring color TV nearer. But until the FCC acts you can neither pay your money nor take your choice. The FCC can.

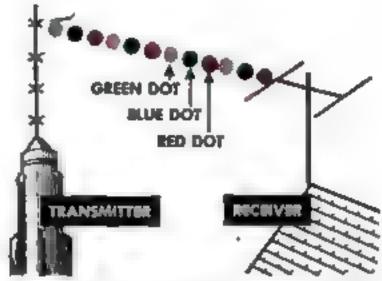
Approve one system;

2) Approve two, or all of them (which would toss the problem into the customer's lap, on a "let the best man win" basis); or

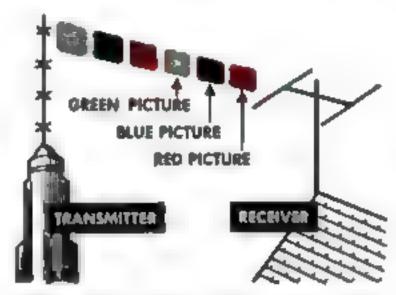
 Approve none and tell the boys to go back to their labs. It did this once before.

But it must decide something. Because, until it does, no new TV stations can be built. And TV will have to stay within its present frequencies instead of moving up into the ultra-high bands. Besides, until industry engineers stop messing around with color, your black-and-white sets will get no better.

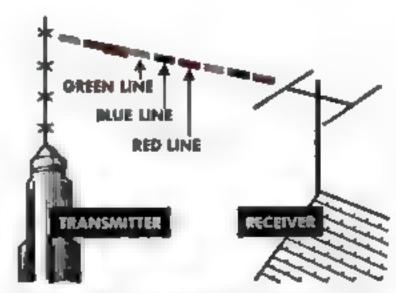
### How Color TV Systems Differ



RCA's "dot sequential" system breaks up each line into individual microscopic specks of red, blue, and green. These are transmitted one after another.



CBS's "field sequential" system sends complete picture in one color at a time. Successive pictures are red, blue, and green. New RCA tube can be used with it.



CTI's "line sequential" system transmits color in successive lines of red, blue, and green. These overlap in receiver in way that gives illusion of full color.



Fabric dome, 20 feet high and 30 feet across at base, is kept inflated by compressor. In center is large movie projector, ready to be moved in. Dome recently withstood 75-m.p.h. gale.

Inside dome, students follow movie target with dummy gun. Gun's sights, also projected onto dome, show instructor how close students are to yellow spot (invisible), correct point of aim.

#### **Portable Domes Train Gunners**

THE British are training antiaircraft gunners in portable fabric domes inflated like balloons to hold them up. Inside each dome, called a Portabel, a movie projector throws images of planes and other moving targets on the walls while student gunners follow them with a dummy gun. An image of the gun's sights is also projected onto the dome, showing how the gun is pointed. A yellow spot on the film indicates the correct point of aim but can be seen only by the instructor—the students wear yellow glasses. Gun sounds and other battle noises help give combat realism. Designed to save costly field training, the domes can be put up in two hours by unskilled crews. After training at one location, they can be packed into trucks and moved to new areas.

#### Hanger Hooks on Car Window

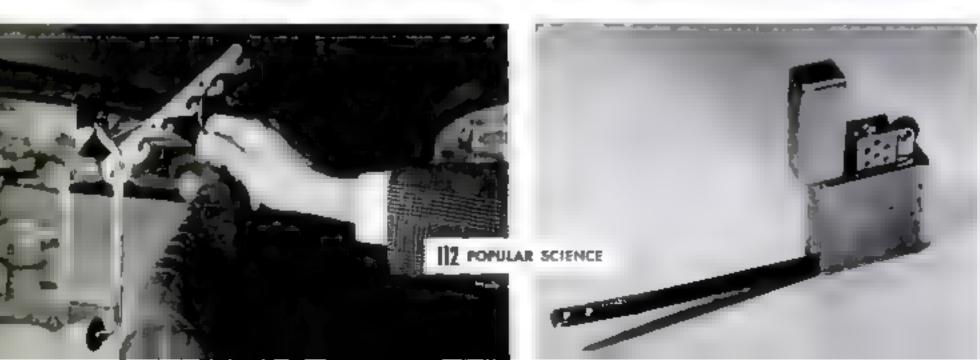
TRAVELING motorists can carry up to 10 garments on this new Hangaway Car Hanger. The top hooks over a window edge while the lower end is held to the glass by a suction cup. Made by the American Steel Products Co., Chicago, it sells for \$1.29.



Double-door air lock lets men and equipment enter inflated dome without air escaping.

#### Lighter Has Built-In Rule

ENGINEERS, shopworkers, and sportsmen who like to carry a pocket rule as well as a cigarette lighter can do both with this new Ruliter. Made by the A. B. Hastings Corp., of New York City, the lighter has a 24-inch steel measuring tape built into its base.



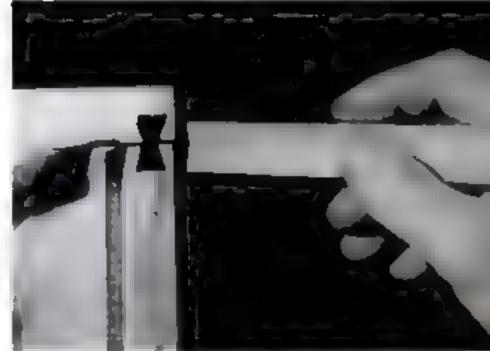


# Prefab Furniture Slides Together

The butterfly dovetail, a favorite of early cabinetmakers, makes a comeback in new build-it-at-home furniture.

By Sheldon M. Gallager
PS Photos by W. W. Marris

YOUNG furniture designer Walter E. Blum started out to build some calancts for his small New York City apartment and ended up with a brand-new kind of furniture. Now he's in business, busily turning out pre-cut pieces of his furniture for other small space dwellers to put together.



Stide-assembly principle is slown above Matching discend grooves a joining pieces form a double doveral sicket Splace called butterfly, is then slid in, locking pieces t gether

Blum calls has creation Slide Assembly Furniture and it is literally just that. All of the pieces come cut to exact size and slide easily together, requiring only glue to hold them in place. To make this possible, Blum borrowed a trick, called a butterfly joint, from the oldtime makers of fine furniture.



Finished hookeases so ally the short 10 minutes. Shell rests on Erasets that can be pushed into different lades to ideast its height.

All the purchaser has to do is loc up two matches glovetail greaves one mercicle part to be joined, and suce an an interboking piece that holds the two parts furths to gether. Some of the units, like the coffee table and during table, can even be left un-



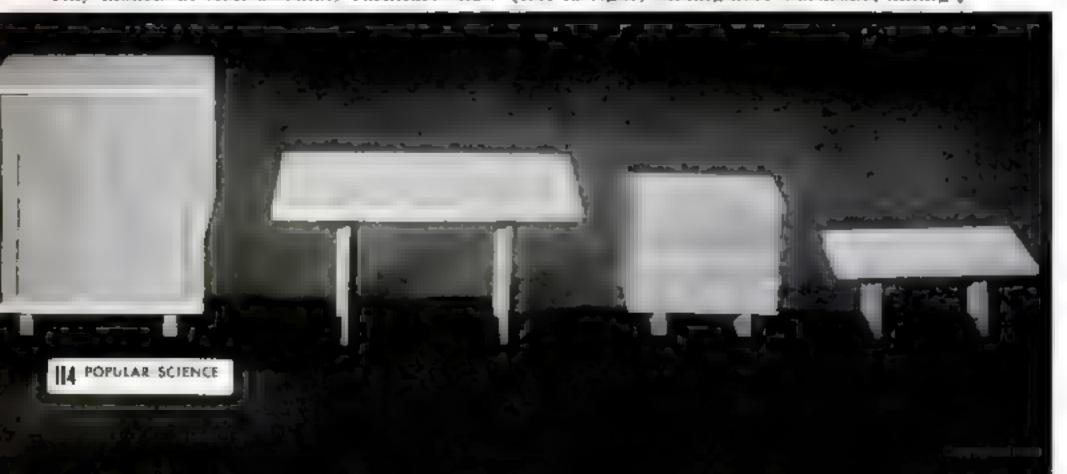
Bookease kit left above) melades everything needed for assembly even gen glice brase and sandpaper not siewen? Construction begins by fitting sides to base which comes with legs defeate attached. Matchan, grooves in sides and base are lined up and splines are supped in

glued in part, permitting quick disassembly for storage or moving

Except for the tables and a taller ward robe all of the modular, multipurpose units are scaled to the same height—28 inches so they can be grouped in any condensation and easily interchanged. For fuller use of limited space, two units can be stacked to gether by simply removing the legs from the upper one. An I all stand high chough off the floor so they clear the baseboard and I t smight against the will giving the sleek modern appearence of built us.

by mass producing the pre-cut, progrooved pieces. Burn figures he saves the purchaser mency while at the same time providing him a type of construction usually tound orly in expensive furniture. His present designs, as alable from the Walter Eblum Co. of New York City, are shown below. Prices ratige from \$16 for the book case to \$57 for the large wardrobe.

Tmy models of state-assembly furniture show (left to right) stating-door wardrobe, draing a





locking pieces together. Splines are inserted from rear and grooves are band run only part way through—so splines can't be seen from front, For permanent assembly, grooves an first given thin can't of glue. Next step is to slide the back down between appright sales. Grooves in

sides and base hald it in place. In final step (shown above) to p is liid on and upper splines are inserted. The rough saiding completes job. Wood comes with veneer of rather birch, slewn here or insplie can be given natural, blond, tinted, stained, or painted hirsh.



Slight clearance at top of sliding doors permits hitting doors out of track and provides them are king it easy to result as two top install large mats lake radio or tell vision set.



Small stool serves as disk chair or oftomal is space misited first power terior record allows. When not in use it its out of way under disk Several used together make sectional sent

table, three-drawer chest, coffee table, desk and stool, sliding-door rabinet, and bookcase.





Bauled to a site by trailer truck, the folded center section is raised by four house jacks.

When the trailer has pulled out, the house is lowered to rest on its own built-in supports.

### Folding House Moves by Truck

On MOVING day, two bedroom wings fold into the center living-room section of this pre-assembled cottage, making a compact 22-ft. by 7%-ft. package for truck transport. The folding feature is made possible by placing all plumbing and wiring lines in the middle unit. The Terrapin house can be occupied six hours after delivery. It was developed by the British as temporary housing at construction sites and other areas without permanent housing.



The house is quickly expanded to full size by swinging out walls of the 7-ft. by 13-ft., 9-in bedrooms. Outside walls and ceilings are covered by sheet aluminum, and are fully insulated.



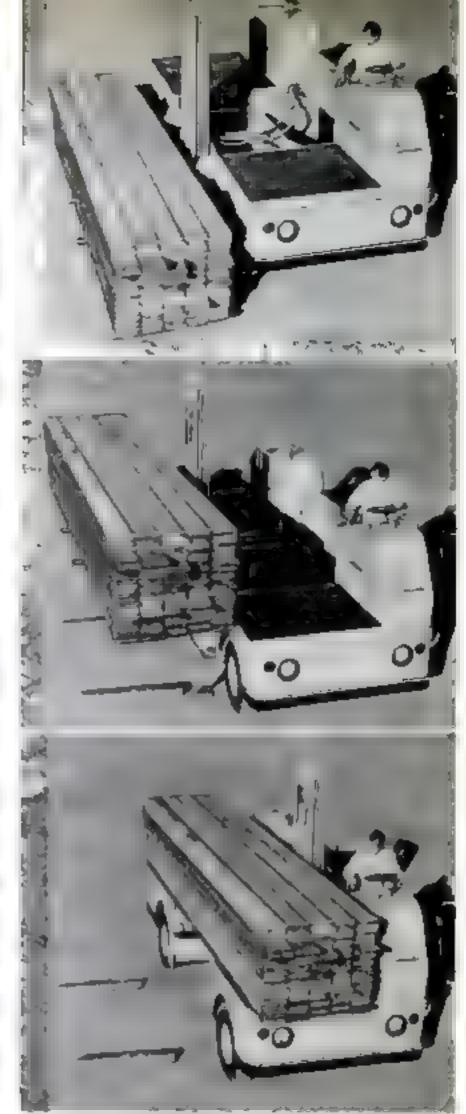
Six hours after delivery, the house is ready to be hooked up to water, power, and drainage

lines. The 333-sq-ft floor area includes a kitchen-bath unit in rear of the living room.





To MEASURE the light output of eightfoot-long fluorescent tubes that wouldn't
fit inside the small spherical photometers
used to test ordinary light bulbs, Westinghouse engineers designed this huge one.
Top photo shows the 700-pound, 12-foothigh plastic sphere open for interior adjustment. When it is closed, prewarmed tubes
are fed in mechanically through the side on
a track. Their light, bouncing off all points
of the sphere, is then reflected onto a sensitive photocell that records its intensity on
meters outside.



#### Side-Lifter Speeds Londing

This new side-loading hydraulic-lift truck can pick up a 30,000-lb, load and be off at 30 m.p.h. in 20 seconds. Carrying its load lengthwise instead of crosswise, it can easily maneuver in narrow aisles or on ordinary roads. To load, its fork extends out side-ways after hydraulic jacks have braced the machine against the ground. For stacking, its fork lifts 12 feet; special arms can increase this to 17 feet. For carrying or unreeling cable spools, it can be fitted with a self-powered spindle. The Traveloader is made by the Lull Mfg. Co., Minneapolis.

Well-drilling rigs like this one are a familiar sight when homes are built beyond the city-water limits. Population growth and increasing needs make old-fash oned wells inadequate.

# What to Do Before Your Well Runs Dry

New drilling techniques and jet pumps help slake the countryman's growing needs for plenty of pure water.

#### By William Gilman

Photos and drawings by Eleanor Gilman

SO YOU'RE planning a new home beyond the city water mains, or remodeling an old one? It should be built on a firm foundation, pure water, plenty of it. That's something too many people who want city conveniences with country living are liable to forget. A little planning will save a lot of expense and grief later.

Recent publicity about New Yorkers going without baths and shaves only dramatizes the situation. From Maine to California, municipalities are doing out water, hunting new supplies, debating what's happened to Nature's water spigots.

Less publicized is the plight of the home owner whose automatic pump starts sucking air instead of water. Even if you can borrow some for drinking, you're in a first-class jam because of your dependence on water in modern living. The toilet won't flush, the hot-water heating system leaves you cold, and the electric washer just stands there looking pretty.

Even so, you can usually pull yourself out of your hole, while your city brother has to wait for vast new engineering projects to be planned, debated, and finished. Unless you live in a really arid region, you can have an expert shoot a deeper well, which usually solves the problem, or put down a new one. The price these days is around \$6-\$8 per foot plus cost of materials.

Improved drilling technique makes costly dry holes pretty rare. Strainers developed

in the past 10 years allow wells to draw clear water even from quicksand. You may have to go through rock, and so get more dissolved minerals in the water—but modern softeners can overcome hardness.

Then there are the comparatively new ejector or jet pumps that make push pull piston ones look almost as backward as the old oaken bucket. You can even get a submersible outfit with a pump and motor that swim hundreds of feet underground.

Proneers found water first, then built their cabins next to it. Drillers swap stories about many moderns who go ahead building a layout complete with swimming pool and automatic sprinklers, phone for a water-finder afterward, then hover nervously as his expensive hole goes deeper. Plumbers complain of the householder who expects a boy-sized pump to do man's work, or a man-sized one to draw from a well that can't keep up.

Recent droughts have been, in a way, a blessing in disguise. Experts agree they have brought the real trouble to light—the inadequacy of hard-pressed water systems that can't stand our growing demands on them.

Living closer together increases our pollution problems, and living easier makes our water needs much greater. We've become a well-scrubbed nation, with even the family car being washed down at six gallons per minute. But water won't stretch. That's why it's best to take pad and pencil before deciding on the new well and the pump for it.

The average daily consumption per person in a modern home is figured at 40 to 50 gallons but varies widely and can easily run 100 gallons. Figure it out for your own

Cal

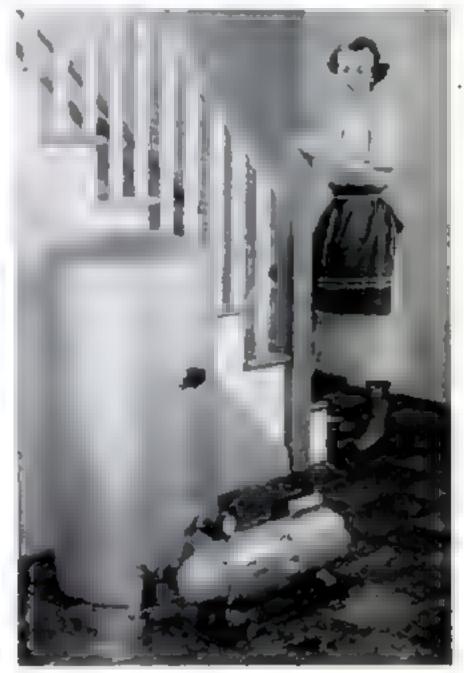
home from the following table:

	Centr
Shower bath	35
Bathtub	25
Toilet, each flushing	6
Lavatory basin, each filling	1%
Horse, daily	15
Cow, daily	25
Hog, daily	2
100 chickens, daily	4
Laundry tub	6-10
Kitchen sink	5-8
G	al. per minute
Linch hose	

%-inch hose 6 Lawn sprinkler 3%



After a well is drilled, plunger-type pump is attached to ng to test water flow. On deep wells of over 100 feet, same type of pump, driven by electric motor, is often used permanently.



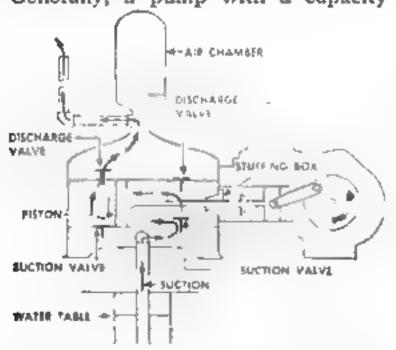
Small, streamlined jet pumps are becoming standard in many homes. This one lifts water about 20 feet, automatically starts when pressure tank gets low and shuts off when it builds up.

But after you've calculated daily gallons, remember there will be peak demands at times like Monday's washing or the morning hour when kids keep the bathroom humming. If you don't want pumping trouble, allow for peaks when clothes washer, dishwasher, shower bath, and lawn sprinkler may all be going at once.

One rule is to add up all outlets that will be in use at the same time, and figure each will need three gallons per minute. A small family might squeeze by with a well producing 2 gallons per minute and a large airpressure tank for a reservoir. But a 5-gallonper-minute one is safer, especially with a

fast-working pump.

Generally, a pump with a capacity of



Old faithful among pumps is this double-acting, reciprocating type. Like jet, it lifts about 20 feet, but can operate on smaller water supply. For deeper wells, piston is in well pipe itself,

around 300 gallons per hour will handle the small home comfortably. One of around 600 g.p.h. is best if your daily needs run between 800 and 1,200 gallons.

If your needs require a deeper well or new one, get a reliable man for the job because he'll have know-how and proper equipment. Water engages in tricky underground activities. At a Connecticut estate, it rises and falls in a well with ocean tides 20 miles away. In sections of Michigan, a well may bring up salt brine. In Louisiana, it can be so near the surface that it floats the oil tank you're trying to bury. In Indiana, one home owner gets his cooking gas and water from the same 100-foot well.

Roughly spenking, there are two kinds of water—surface and ground. Surface water, piped from streams, ponds, and some springs, can be used for many purposes, al-

though in populated areas it's generally unsafe for drinking. Many rural dwellers with drought-hit wells use centrifugal pumps to supply surface water for gardens, livestock, irrigation, and fire protection.

Ground water is the old stand-by for home needs. It's rainfall percolating down into spongy gravel and sand, and collecting in pores and crevices of underlying rock. This ground water is in constant movement. Its upper surface is the water table, which sinks in dry seasons. Sometimes you can tap it from natural springs and fissures. But usually the trick is to get it up a pipe by suction.

The old-fashioned stoned-in well is often sufficient, but because of pollution dangers and lowering of the water table by drought and heavy use, most wells these days are going deeper. It's done by driving pipe through softer stuff, drilling in rock, and bailing out the muck. The result is a tubular well formed by the pipe casing.

#### Rock Man and Gravel Man

An experienced driller knows the terrain, where to shoot, and how deep he may have to go. He can read tell-tale signs in the mud he bails out. He's most valuable if he's both a "gravel man" and a "rock man" instead of a specialist in just one. Some of the hest wells are brought in, at less expense, from spongy sands and gravels above rock.

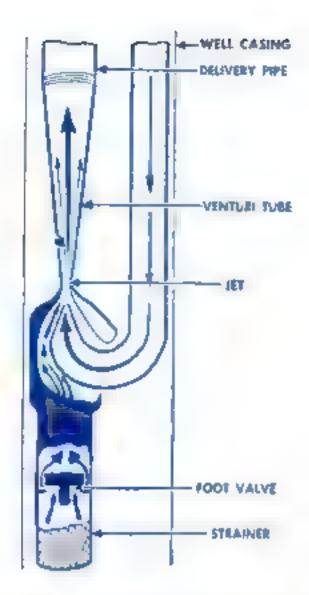
One driller gave up after going down 640 feet, most of it through rock. He had cased right past water-soaked gravel that a new

well tapped at only 70 feet.

It's a knack knowing how to gravel-pack a well properly—how to pump out sand and leave a screen of natural gravel to act as water filter. If it can be done, that's the best way.

Drillers say their biggest help in the past 10 years has come from the new, noncorresive screens that make it possible to draw clear water from beds once shunned. Such a strainer, either within the casing or placed below it by jacking up the casing, may be 50 feet long and any mesh desired. One driller went down 150 feet and hit genume quicksand that oozed 100 feet up the well Instead of giving up, as he would have formerly, he installed the proper screen—and that well now draws 40 g.p.m. of crystal-clear water.

Figuring a well's capacity is more than calculating how much water is down there. It may stand 100 feet in the pipe. But when you start using it, how fast will new water



High-speed, twin-pipe jet pump can lift water 120 feet. Stream shooting down pipe at right through jet nozzle and into venturi tube creates vacuum that draws well water up pipe at left.

come in? That's why the driller uses a test pump to find the "draw-down point" where the well is giving as much as the pump is taking. This gives the gallonage you compare with your needs and use in determining the size of pump to install.

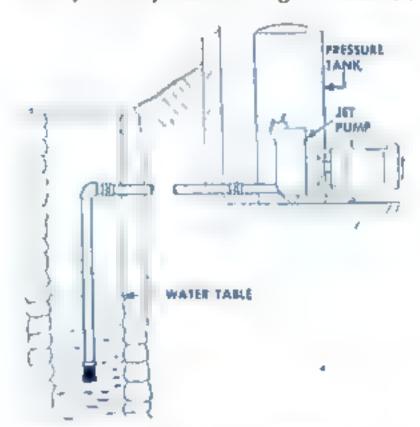
It's necessary to watch out for trickery down the well, which may be drawing from a temporary pocket in rock and do fine until that supply is emptiod—and then the level drops like a plummet. Overnight the pocket may refill and repeat the trick. That's why a good driller will pump eight hours steady before he is satisfied with the test.

There are many types of motor-driven pumps—but for home use you're likely to pick a reciprocating or jet one. The former is the old reliable that's based on the handpump principle of a piston stroke pushing out water, leaving reduced atmospheric pressure behind to bring in more water for the next boost. Shallow-well types lift water about 20 feet (lift is from water table to pump—not delivery height) and are handy for basement installation. If you need more lift from a piston pump, there are deep-well models in which the plunger is worked up and down the well.

Piston types are fast being outmoded by jet pumps. Most manufacturers have begun putting out lightweight models that are non-corroding, self-priming, and quiet. Many come mounted right on a 15- or 30-gallon pressure tank, providing a neat package to fit any small corner. These high-speed pumps—a %-hp. motor delivers 600 g.p.h. at 20 feet suction lift—work on a combination of venturi and centrifugal principles.

The only moving part is the spinning impeller. While whirling part of the water through a discharge pipe, it sends the rest back down through a line ending in a jet. As the high-pressure stream sprays out into a cone-shaped venturi tube, it creates a partial vacuum, pulling more water up the well to within reach of the impeller. The outfit is really two pumps working together.

The jet's only disadvantage is that it re-



This type of jet pump is installed in house basement instead of in well easing, permitting well to be up to 600 feet from house. Here suction pipe is simply dropped down open well.

quires a good water supply behind it. Advantages are many. Unlike a piston type, its flow is steady and operation almost noiseless. It's a fast worker. As house pressure decreases, pump capacity increases—a %-hp. jet will deliver 500 g.p.h. at open discharge. It can go without oiling and greasing for years.

What's often important, it can be installed in the house 100 feet or more from the well. This allows a choice of where to shoot for water, and does away with need for a frost-proof pumphouse out over the well.

Theoretically, with perfect vacuum and

no friction, a shallow-well jet would lift water 33.9 feet at sea-level atmospheric pressure. Actually, its lift is usually around 20 feet. The deep-well jet is good for a 120-foot lift, and multistage versions will handle over 300 feet.

For shallow wells, the jet assembly is right in the pump. In deep-well types, it's down in the well casing. A pressure pipe goes down the well to the jet; another pipe brings water up to the pump. For smaller jobs, there is a single-pipe system in which space between easing and inner line is used in place of a second inner pipe.

If your supply turns out to be insufficient and the well needs deepening, a shallow-well jet can sometimes be converted

into the deep-well type.

#### Motor Goes Down the Pipe

Even newer is a pump you don't see at all. With Submerga-Pump, the whole works—motor and pump—goes down the casing into the water. A heavily insulated power cable feeds it and the water itself cools it. Working on the multistage centrifugal principle, it was adapted from a design long used in oil wells. Requirements are easing at least 4 inches in diameter and water that's free of sand or other abrasives. The manufacturer claims pumping depths to 480 feet and capacities to 1,740 g.p.h. If the water table drops, all that's needed is to lower the outfit.

Whatever pump you use, it's standard to equip it with an air-pressure tank. The air trapped and compressed inside it provides energy to deliver small amounts of water, preventing the motor from starting every time you draw a cupful. It also serves as a cushion, absorbing the pulses of reciprocating pumps. The pressure switch is generally set to cut in the motor when pressure drops to 20 pounds and shut it off at 40 pounds.

#### Test for Pollution

Before hitching up a new system, be sure the water isn't polluted. This has always been a must, and is even more important now when homes crowd each other. Water may look clear as crystal and still be chockfull of germs. Polluted water can produce typhoid fever and a long list of other diseases. As you'd expect, a spring or shallow well is more likely to be contaminated than a deep well.

In suburban communities, wells may be fed by neighbors' drainage. Some surveys



Nature does her own pumping in true artesian well like this one at the Vermont State trout hatchery near Bennington. It delivers a steady 250 gailous a minute from depth of 110 feet.

indicate that probably half the water systems on old-fashioned farms are unsafe. The well platform or easing may not be tight enough, allowing foul drainage to come in. Or the well may be too near the barnyard.

Distance and elevation help, but what goes on underground can't be seen. Water drawn from porous ground or a seamy ledge can receive a long-distance taint. A well can even draw pollution from lower ground—when drought and heavy pumping drop the water table enough to make water "run uphill."

Supposedly a septic tank converts and purifies everything coming into it. But there has been proof to the contrary; a septic tank may be overloaded or need replacing or cleaning. Badly functioning tanks have caused deaths from polluted drinking water.

In any case, analysis is the only sure answer. No water supply should become a permanent fixture until it has been okayed by a health officer or state laboratory. For safety, take samples during both wet and dry spells. If you must use untested water in the meantime, it should be boiled or chemically treated with lime or iodine. Check with your doctor on the best method.

While installing the water system, also remember what winter may do. If you depend on a well or spring away from the



Hydraulic ram, self-powered, is dependable for moving surface water if conditions are right. Falling water keeps closing valve, causing backpressure kicks that ram water up to tank.

house, the pipeline may have to be buried as much as nine feet deep in some parts of the country for safety against freeze-up. In wet ground, it will need less protection. If you have a good spring, you can make a small brook out of its overflow and lay the pipeline in it. Water running over the pipe will prevent freezing.

Another way is to keep water always flowing through the pipeline. This can be done by having a by-pass through the basement and out through a drain. But don't try this with a motor-pump system; constant operation can burn out the motor.

#### Keep a Fire Hose Handy

An outdoor system should have a shutoff valve, allowing it to be cleaned or drained if you're going away for a few weeks or longer. Another tip—whatever your system, better have a handy outlet to which a fire hose can be permanently attached.

Besides a shallow or deep well, there are three other water sources for the home. If you own a spring, its water will probably be soft, cool, and sparkling. It's especially valuable if located above the house, so that Nature will do all the work by gravity. My own spring, at 70 feet elevation, provides an ideal 35 pounds pressure at the kitchen sink.

A small reservoir should be dug out at

the spring, or near it, to accommodate peak needs. A pair of standard concrete drains, two feet in diameter, will store around 100 gallons if you stand them on end. Hardware cloth covered by wooden lids will keep out leaves and animals.

A spring should not only be pure but faithful and adequate. Too many gush in April and can't deliver in August. If the spring is fickle it's cheaper in the long run to shoot a well.

#### True Artesian Has Pressure

A cross between natural spring and drilled well is an artesian supply. There's cause for celebration when the driller brings in one. Here Nature does the pumping after man provides the pipe outlet for underground water under pressure. So many drillers, as well as laymen, refer to an ordinary drilled well as an artesian that the word has almost lost its real meaning.

For a true artesian, underground water must be flowing downhill under a tilted rock formation. It wants to seek its own level but can't. Boring through to it provides an outlet and the water comes up the pipe. In some terrain, it shoots up geyser-fashion. One brought in at 3,100 feet yielded 750,-000 gallons a day—shooting it 32 feet above ground.

Where conditions are suitable, a hydraulic ram can be used to give surface water from spring, brook, or pond a boost to the storage tank in the house from which faucets are fed. The ram makes water raise itself by its own bootstraps through a system of valves using the water-hammer principle. Much of its water is wasted in order to boost the rest, so the first requirement is a plentiful supply.

In the right place the motorless ram works like magic, raising water up to five times higher than its drop to the ram. I've seen some thudding away merrily after 50 years' service. The ram, the most economical pump in existence, requires only a valve replacement every couple of years. It can even be homemade (PS, Oct. '48, p. 231).

But since ideal conditions are rare, the ram is fast becoming a curiosity as power lines keep spreading through rural areas. They allow you to hitch up an automatic electric pump that's inexpensive and dependable. In harness with a proper well, such a pump will bring up the water that's still abundant underground even when drought is doing its worst up on top. END

### Midget Scope Rivals Biggest

A TABLE-TOP electron microscope, to be introduced by RCA this September, approaches the world's mightiest instruments in power. It magnifies directly up to 6,000 diameters, and takes pictures that can be further enlarged to 50,000 diameters.

Permanent-magnet lenses of newly available material, replacing the electromagnetic coils used in big electron microscopes, permit the extremely compact and simple design. Auxiliaries are a power-supply cabinet, two vacuum pumps, and a control panel. The midget 'scope is expected to sell for less than \$6,000, enabling it to become a standard tool in hospitals, and in college and even high-school laboratories.



To get portrait of a virus, user inserts plate holder as above. Simply pulling out knob at right, and pushing it back, makes the exposure. Enlargement from plate reveals finest details.



Table-top 'scope made this picture showing tobacco mosaic virus magnified 40,000 diameters.





Tinv holder containing specimen, placed with ferceps in slace of new met scope as slower, is pushed by kinds into viewing position. Corper splice one sees 50 000-volt received gun.

As simple to operate is in ordinary a cross por ow table top electron a crossope has magnaty may power in restains 20 times as great apport in length of of anglitical anstronicity is worst.





#### 48 Radio Tubes Built in One

By BUILDING 48 separate tube "units" inside one tube, RCA engineers have made what they believe to be the most powerful electron tube in the world. Intended primarily for radiotelegraph and international broadcasting stations, it can put out 500,000 watts continuously. In the photo above, the top has been lifted to show the cylindrical arrangement of the 48 separate triodes that make up this "Super-Power Beam Triode."



#### **Power Door Opens at Touch**

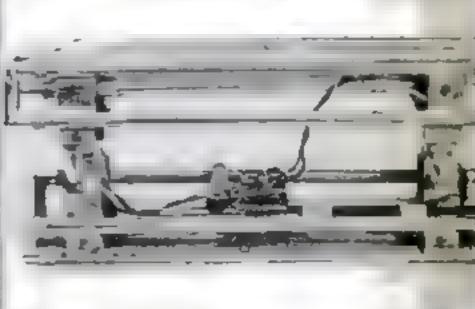
Just a touch on the handle, even by small fry as above, and this door opens. The invisible doorman is an electric-hydraulic power hinge, hidden under floor or sidewalk and actuated by a microswitch in the handle. Unlike electric-eye devices, it needs no obstructing posts and opens doors both in and out. The power hinge, called Pitteomatic, was developed by the Pittsburgh Plate Glass Co. primarily for heavy glass doors.

#### Sensitive TV Mike Picks Up Sound Selectively

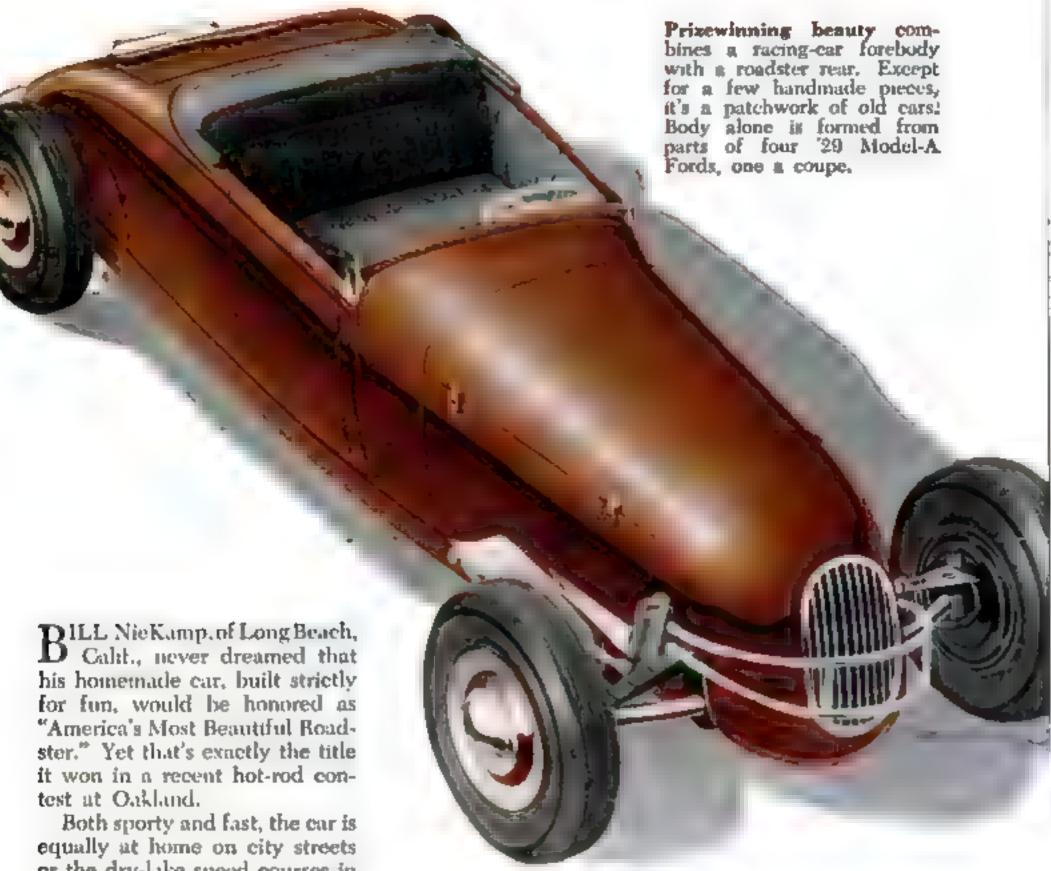
CLUTTERED television studios may be freed of bulky microphone booms and dollies by a new type of directional microphone. Its "aim" is so sharp it can pick up wanted sounds 12 feet away while ignoring those not desired. Two of these RCA micro-

phones are shown suspended above a stage set, below left, while a technician at a console switches from one unit to another to follow the actors. Each unit, shown at right below, uses two microphones, with eight feet of acoustical pipe for directivity.





## Homemade Roadster Wins Beauty Contest



or the dry-lake speed courses in Southern California where Nie-

Kamp frequently races it. Building it took him an estimated 300 working days, spare time from his regular job as an automobile painter. As you'd expect, the body firmsh is gleaming, set off by chromium plating on much of the running gear. The car's clean lines don't betray its patchwork origin.

Double sets of rear-end shock absorbers provide smooth riding as well as good control. For speed runs, the twin asbestoswrapped mufflers can be quickly removed and replaced by racing stacks, which are installed through special snap-out plugs in the belly pan. Both the firewall and pan are designed to conduct ample cooling air past the engine during high-speed desert runs. For night driving, a pair of headlights can be quickly fitted.

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Roudster has '39 Ford rear end, with torque turn shortened 15 a. Dr. ve shaft is Mosel A. New wheelbase is 110 in Frontiels are from 27 Lasex litted with Madel-A regretors member



Aluminum cowl and hood, together with grille, were handraide. The front side is from a 39 Ford but has been litted with a rher moral spring perches. Brakes are '41 bard hydraulius



Speedy engine is '42 V-8 Mercury, of stock bore and stroke, with Evans heads, Weiand manifold, Kurten ignition, and Thompson 3-ring pistons. Rear support is Model-A crossmember



Unusual steering mechanism is 35 Ford crosssteering assembly turned on side racer style, for ground clearance. Bear axle has feardrop fairnigs bailt around it to cit air resistatec



Dashboard is clean and sample, with '49 Plymbuth instruments grouped in center. Steering column gear shift and transmission are from 49 Ford. Headlights are added for night driving.

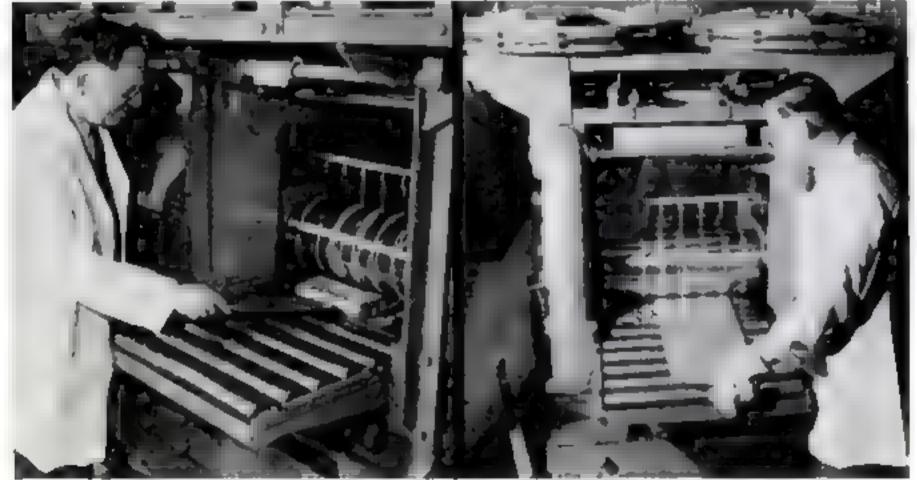


Rear end boasts two sets of shock absorbers, a pair of Hondaille needle-adjusted Fords and two tube-type Gabriels mounted at 45° angle to control body sway. Gas tank is '28 Chevvy.



I Molten metal is poured into a mold during the process used to make aluminum sheeting at the Kaiser Co.'s numature mill, where alloys are tested before being run through big mill.

2 After a 23-th, ingot is removed from its book-shaped mold, it is placed in an electric furnace with other ingots for a heat-soaking treatment to bring them to rolling temperature.



3 When an ingot has been properly heatsoaked, it's pushed in for its first pass through the baby rolling mill. A 50-hp, motor runs mill, which can make sheet only .01 in. thick.

4 Operator above pulls aluminum sheet out of machine, whose rollers squeeze with a pressure of 700,000 lb. A full-size mill uses 2,000,000 lb. of pressure to flatten a 5,000-lb, ingot.

# Midget Rolling Mill Trys Out Alloys

BEFORE a new alloy is okayed for use in the huge Kaiser aluminum rolling mill at Spokane, Wash., the metal is given a trial run through the pint-size version shown here. On a small scale, this pilot plant duplicates all the complex processes of its big brother that squeezes 5,000-pound ingots

into nearly 125,000 tons of sheet, strip, and plate aluminum annually. Miniature ingots weighing 10 to 23 pounds are fed into the six-foot-high rolling mill. After the alloy castings have been rolled into thin sheets, they are heat-treated and then carefully tested for strength and hardness.

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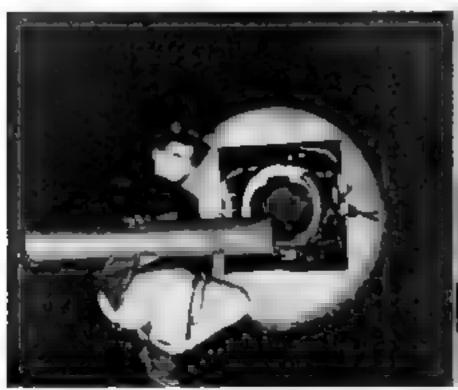
#### Mower Works Like Scythe

CENTRIFUCAL force holds in cutting position the four 2%-in., free-swinging blades of the lightweight %-hp. electric mower pictured above. The blades are mounted on the rim of the horizontal disk seen in the underside view (inset), which revolves at high speed. Built by the Huffman Mfg. Co., Dayton, Ohio, the mower cuts a 16-in. swath. It will mow to within % in. of any obstacle when a front wire guard is lifted.



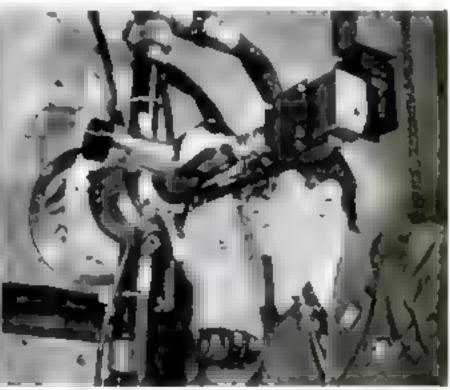
#### Colors Warn of Ray Peril

A NEW civilian-defense Geiger counter, developed by the AEC, has a tricolor scale to gauge radioactivity after an A-bomb blast. Its needle swings to green in a safe area, yellow where it is unsafe to tarry long, and red as a warning to get out at once. Topmost reading, five roentgens an hour, is a new high for Geiger counters. Powered by flashlight cells, the device could be mass-produced for only \$10 to \$15.



#### Periscope Looks Into Jet

MOUNTED squarely in the 2,500° exhaust blast of a jet engine on a test stand, the stainless-steel periscope above gives a closeup view of an inferno. Standing at the eyepiece on the opposite side of a wall from



the exhaust, as seen in picture above, a CE engineer can study the pattern of burning gases. For a permanent record, color movies may be made through the 'scope. A cold-air blast protects its inner window of quartz, and a 45-gallon-a-minute water-cooling system also safeguards both window and tube.



Dushboard controls appear conventional-except for bar, to let passenger select stations, and

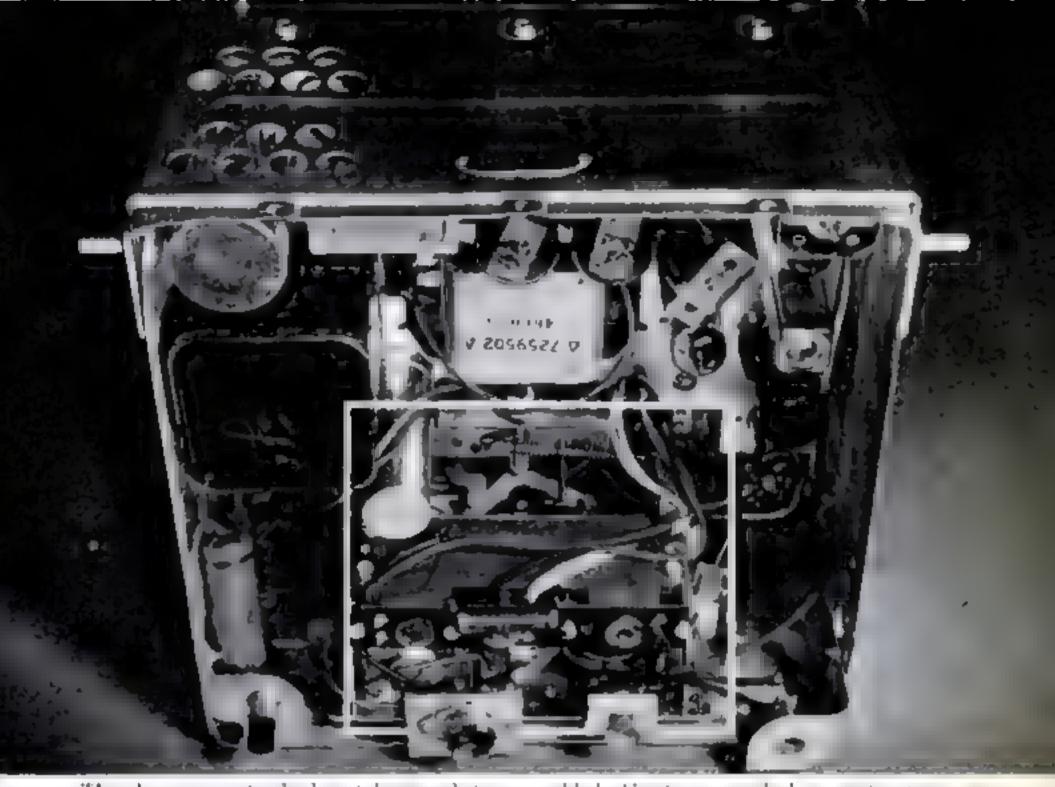
sensitivity centrol. This adjusts tuner to stop on all stations, or to past by the weaker ones,



Selector button is next to brake. Each time it's pressed it tunes radio automatically to next station within range regardless of where car is. No presetting to station frequencies is needed.

THERE'S a real "lazv-man's radio" in some of the new Buicks. All you have to do is press a button, whereupon the Selectronic receiver searches for a station and stops right on it. If you don't like that program, press the button again and it hunts the next one, and so on. Unlike ordinary preset push buttons, which are ust-less when you drive beyond the area they were adjusted to, this gadget works any where in the world. You don't have to know where stations are on the dial

A simple clockwork gear train, a relay and solenoid, and one extra tube turn the trick. Pressing the button lifts the brake on the gears. Spring loaded, they tune through the broadcast band until a signal is picked up. The signal fires the trigger tube, which resets the brake. This stops the tuner right on the station—much more accurately than you could set it by hand. The trigger circuit discriminates between stations and power-line noise or static. When the tuner has crossed the dial, a solenoid automatically pulls it back and hunting starts again.

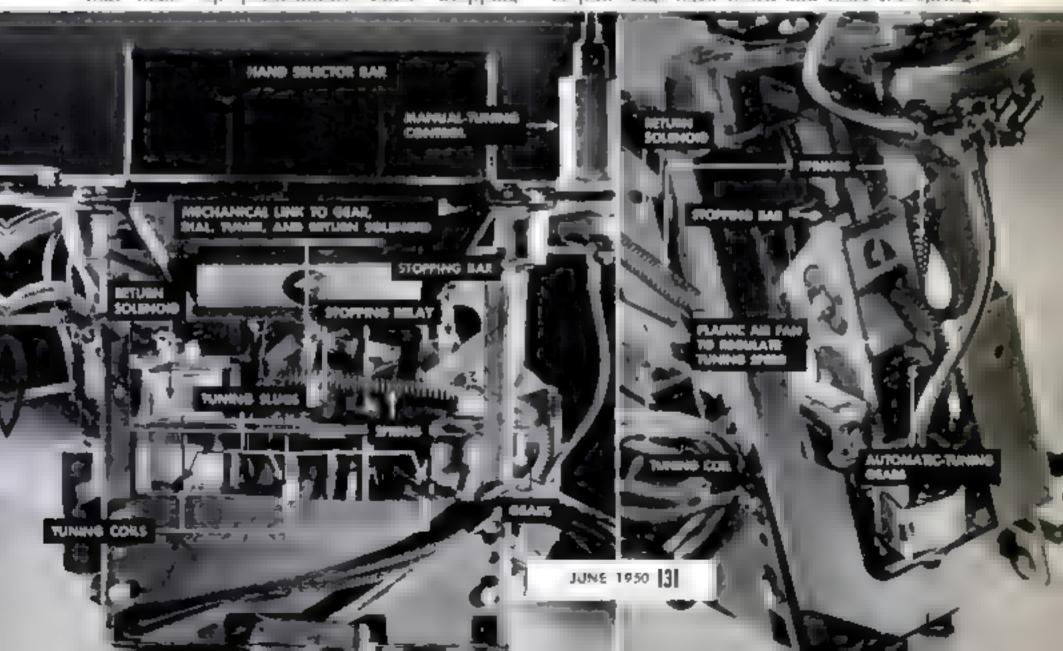


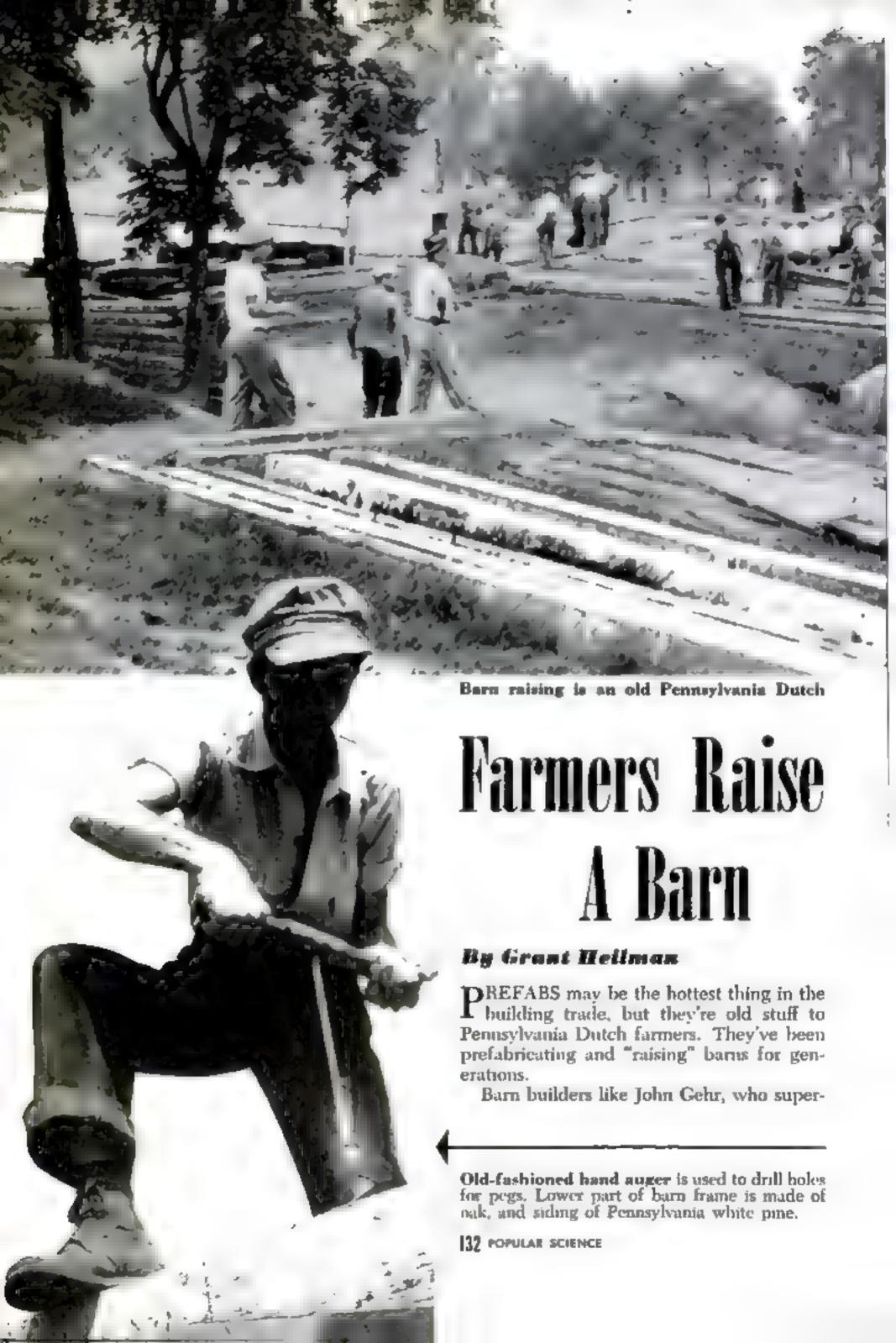
The chasen is a standard six-tube superheterodyne, to which the automatic timer has been

added. The timer marked in photo above is shown lickwas it looks when repoved from set

Gear train, shown in closi-ups below starts tuning across dial when stopping bar is bited by relay. If times by raising sbigs out of coils that make up permeability timer. Stopping

for brokes gears at station when frigger tube fred by signal trips reas. When sign are ill the way out swot a coorgives solution to pink slogs back down and reset the springs







custom. Here neighbors arrive for big event.

vised construction of the one shown here, near Ephrata, Pa., don't even use blueprints or drawings. The only paperwork involved is in calculating the amounts and costs of materials—about \$12,000 for this barn.

Gehr and his skilled carpentry crew work for several weeks before the actual "raising." They cut more than 500 timbers to size, notch each one according to the position it will have in the finished frame, and drill each timber for the wooden pegs that will hold it in place. As each piece is finished, the carpenters place it on the ground beside the pieces to which it will be joined.

All this painstaking labor pays off when more than 100 volunteer helpers show up on the day of the raising. Under Gehr's direction, it takes them less than five hours to assemble the framework. Every piece fits exactly, and the only tools used are hammers, pike poles, and crowbars.

"It's just like a jigsaw puzzle," says Cehr.
"There's nothing to it, especially after you've been building them for 40 years."



In the hands of an expert, the adze is a versatile tool, and can cut a chip the size of a main fist, or slice a shaving as thin as paper. Cutting blade must be kept razor sharp.



Strength of the completed barn depends on complicated joints, such as the *eesel finus* (mule's foot) shown above. All joints are cut before any part of the barn is assembled. It takes experience to know where each should be used.

Not a single nail is used in the framework, Hundreds of sturdy oak pegs, like those below, are cut before raising. They are driven into holes drilled in the timbers, then cut off flush.





Old-fashioned muscle power puts grant beam where it's needed. Longest single timbers, 45 feet, span entire width of barn. Steel girders are used only in foundation against dump hillside.

Carpenters use block and tackle to lift joists into place. These run the length of the barn, and are set into the stone foundation. Supporting posts are set in concrete on barn's floor.



Everyhody gets into the act for a major raising job. The men are using long pike poles, or "stockades." The entire section, including diagonal braces, was preassembled on the ground.



Here first of the top rafters are swung tho place. Roof is of gambrel type, with a flatter slope at the top. Havmow is reinforced so sides won't bulge when it is tightly packed.



After framework has been raised, carpenters put on siding and finish the roof. According to Gehr, design for barn was brought from Switzerland by early "Pennsylvania Dutch" settlers.

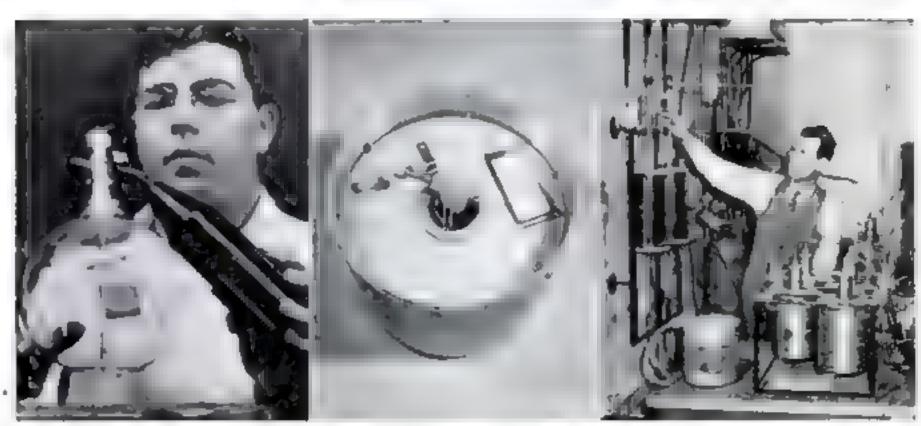


Mr. and Mrs. Levi Zartman inspect the stable of their new barn, raised by neighbors to replace one that burned. The completed structure is 45 feet high, 45 feet wide, 76 feet long.

## Hot Breath Sampled For Safety

THIS, literally, is a I breath-taking job. To protect workers who handle radioactive materials, the National Bureau of Standards in Washington takes breath samples sent in by private companies and government laboratories and analyzes them for harmful particles. The worker at right is shown breathing into a balloon. His breath is then collected in a vacuum flask, which is mailed in a metal container to the Bureau. There a series of complicated tests determine whether he is inhaling a dangerous number of radioactive particles. If the concentration is too high for safety, such precautionary measures as improved ventilation or rotation of workers are in order. Otherwise, the worker might get cumulative radiation sickness. END





The gallon-sized flasks are tested with a 2,000-volt, high-frequency electrical discharge (left). If vacuum is complete, sealed flask gives off

bluish light. Metal mailing containers (center) are tagged with identifying number and date. Bureau's technicians (right) give the final word.

# Just <u>to Steal</u>

Thieves get a startling surprise when they tamper with a truck that screams out loud for help.

By C. C. Nash

PS photos by Hubert Luckett

J EWELRY salesman Jack Seide came out of a customer's store to find his car broken into and his sample kit gone.

"Second time in a month," he muttered. "This is getting to be thresome—and ex-

pensive."

So, Seide, having a practical knowledge of electrical equipment and mechanics, made a contraption out of wires, a siren, a handful of triggers and other gimmicks, and a special coded lock. It was crude, but it worked, and the next thief that tampered with Seide's car set off an alarm that sent the burglar away from there at approximately the speed of light.

That was the first Babaco Alarm, devised by Seide in 1931 to protect his samples.

That siren reverberated over a lot of territory. The news soon spread to other salesmen of valuables, as well as to shippers and truck owners. Before long, Seide was out of the jewelry business and in the business of manufacturing truck alarms.

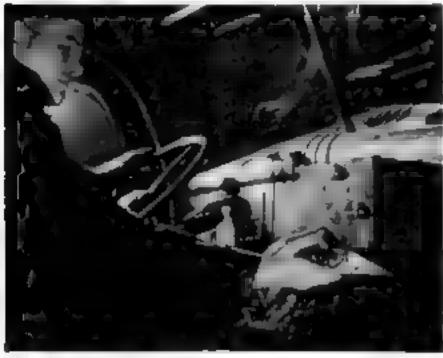
In the 17 years since Seide shifted his occupation, his Babaco alarms have been guardians over some 250 billion dollars worth of truck cargo, without a single dollar

lost by theft.

In the same 17 years, thigves have got away with an estimated \$200 million in furs, liquor, woolens, cigarettes, and other valuable loot—even kitchen sinks, eggs, construction steel, sewer pipe, and Frank Sinatra records. Not a single one of those losses involved a truck with a Babaco Alarm.

In New York City recently two trucks were stolen in one night from a terminal parking lot. They were the only trucks in the lot that were not Babaco equipped.

If you ever hear the Babaco Alarm shricking from a truck, you can be sure that the thieving culprit is a novice. Usually he will need only one lesson. The alarm has a



To leave truck, driver must first turn key to proper position in alarm's "brain," mounted on dash, then push right coded buttons underneath. Timer then gives him few seconds to get out.



Siren and battery are mounted in box under body of truck. To open van doors, driver must turn key that temporarily disconnects alarm. If box is jimmied, vibration starts siren going.



And if a thief thinks he might force a door in spite of the alarm, jump in, and drive off into some hidden side road to unload, he's due for a disappointment. The clutch freezes and the vehicle won't move until the driver properly operates the coded

push hutton lock under the dashboard.

A thief may try to remove or break into the siren itself, the vibration automatically sets off the alarm. And cutting the wises won't do any good either. Closed circuit relays see to this Breaking one circuit simply closes another, and the siren sounds off anyway

With few trucks exactly alike in structure, the alarm system is tailored to fit each type. In a typical setup, a box made of tamper-proof metal is installed upon the body.

This box holds the battery, the siren, and the intricate apparatus that makes it all function. The front of the box opens with a special key (no two keys are alike). And even this has a trigger appliance so that anyone opening it other than the authorized operator will set off the siren.

Trigger connections also are wired into every door, window, or other opening in both cab and body. And under the dash is a series of coded push buttons. Only the driver knows the secret for a silent start.

To neutralize the alarm, the truck driver first unlocks the system with his key. This gives him a certain number of seconds to get into the cab and operate the code buttons. If he takes too long to push the buttons, the alarm goes off even for him. If his timing is right, however, he can drive off or open the truck.

#### A Year's Workout in a Quarter Hour

Before installation, every Babaco Alarm and every part of the unit goes through elaborate tests. One testing instrument simulates, in fifteen minutes, all the shocks, jars, and jolts that a truck would get in a year's operation. Another pushes in and out 50,000 times the plungers that govern window, door, clutch, and "parker" controls. A cold test puts every vital part through 30-degrees-below-zero operation; a heat test reproduces scorching desert temperatures.

The alarm systems are leased, not sold. By leasing, Babaco can make certain that its truck alarms will be checked every 30 days by experts in one of its 200 branches throughout the country.

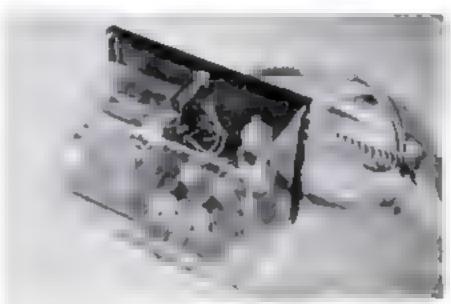
The alarms are constantly being improved to meet new truck conditions and new twists in truck thievery. Long-haul trucks, carrying as much as \$100,000 cargo, often arrive at their destinations in the dead of night, too late to be unloaded. They have to stand by, locked of course, until morning. Recently a gang drove up to truck terminals at night with their own tractor units, and towed off parked, loaded trailers. Even the Babaco Alarm couldn't sound off under such conditions, for it was triggered only

Babaco engineers went to work, however, and almost before the truckers themselves were aware of the new thievery trend, a new gimmick was ready. It was a "parker" alarm, designed to go off not only when tampered with, but also if the vehicle was moved by anyone but its driver.

by tampering with points of entry.



To enter cab, driver must shut off system with key, or opening door would set off alarm by releasing push switch set in jamb. Even if thief gets in, clutch freezes and truck won't move.



Alarm's "brain," shown here in plastic case, reveals intricate innards. Muster key at left is kept by truck's owner, one at right by driver. Box's lock at top can be opened only by Babaco.



For repairs and inspection, serviceman first opens an outer door. An inner lock then opens a hole through which he inserts screwdriver, as above, to gain access to the siren mechanism.

### Tank Razers Work from Rowboat

When salvage workers in Ene, Pa., recently dismantled a steel water tank 125 feet high, they did the job from a rowboat floated-inside, instead of the usual scaffolding and bo'suns' chairs rigged on an empty tank. Men and equipment could thus be lowered to a new working level, when necessary, simply by releasing the water inside.

The standpipe was cut away in 1,000-lb. sections by gas torches, and then lowered to the ground, as at right, by cables attached to a hoist that was mounted on a truck. An oil drum hooked to the side of the tank held the gas cylinders that fueled the torches. Ace Junk & Salvage Co. did the job.





#### Electric Eye Gets Smaller

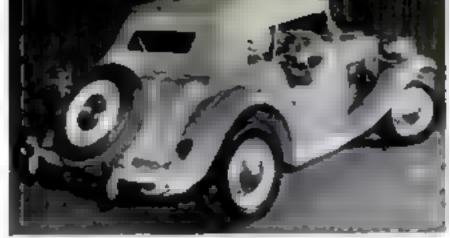
Timer than a paper clip, the tube above, shown actual size, is a new type of electric eye. Called the Phototransistor, it is sturdier as well as smaller than present photoelectric cells. It stemmed from development of the transistor (PS, Sept. '48, p. 117), a device that performs most of the functions of the vacuum tube without requiring a vacuum or a filament supply. Bell Telephone Laboratories developed the eye.



#### Shovel's Cab is Air-Cooled

The operator of the electrically powered shovel above keeps comfortable in an air-conditioned cab even while it's handling steel-mill slag at 2,800°. Mounted on top of the cab, the cooling unit supplies 400 cubic feet of air per minute, filtered through fume-removing canisters. Using Freon-114 gas, it keeps temperature inside the cab down to 80°. Dravo Corp., of Pittsburgh, Pa., makes the cooler.

## M. G. Gets Coil Springs,



With top up, low-slung M.G. stands 4 ft. 5 in. high. Note deep-cut doors, exposed fuel tank.

## New Frame, More Speed

Faster and sturdier than its forerunners, this famed sports car now makes its first bid for comfort, too.

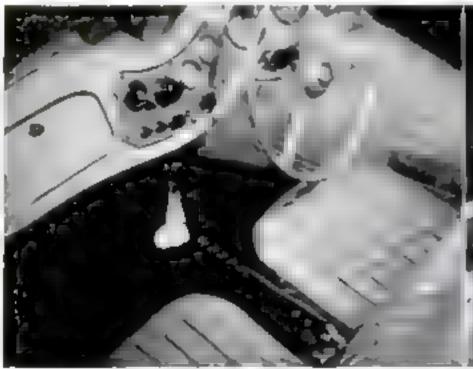
By Sheldon M. Gallager
PS photos by W. W. Morris

WHILE most American motorists have been taking a smooth ride for granted for years, the British-made M. G. Midget has been quietly exciting sports-car fans all over the world-without a knee-action to its name. Now, for the first time in its 21-year history, the snappy little two-seater will have independent front-wheel suspension with coil springs.

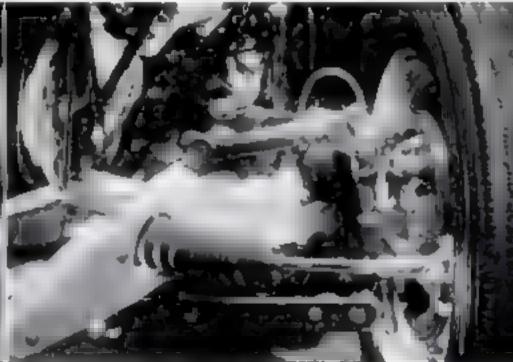
The M. G. isn't backward—just cautious. Its engineers took years to make sure they could come up with a design that would provide the smooth-riding comfort of coil springs without sacrificing the speed, ruggedness, and road-holding ability long expected of the M.G.

The result, except for appearance, is virtually a new car. The softer suspension required a more rigid chassis, so the old channel frame had to be discarded for a sturdy box-section frame. The heavier chassis, however, boosted the car's weight to 2,009 pounds, a 198-pound increase that threatened to steal vital speed. To offset this, wheels were made smaller, providing, in effect, a lower axle ratio. Now, despite the added weight, the same 54-hp. engine gives the new 1950 Midget, designated the TD, a top speed of 83 m.p.h., some 5 m.p.h. better than its predocessor, the TC.

In styling, the M.G.'s long-famous racy bnes remain unchanged, except for a body four inches wider that gives greater roominess inside. Increased stability is also provided by a slightly wider track. At high speeds, the new TD will get 27 to 30 miles on a gallon; at low speeds, as much as 42 miles. Price? You can pick one up, delivered in this country, for about \$1,850.



Double-hump dash is unchanged except for regrouping of instruments closer to driver. New one-piece seat back adjusts for tilt. Lever between seats is hand brake. Upholstery is leather.



Independent coil suspension, a sight few M.G. followers expected to see, replaces old hard-riding leaf springs. Coil spring is supported by A-frame pan. Steering is rack and pinion.

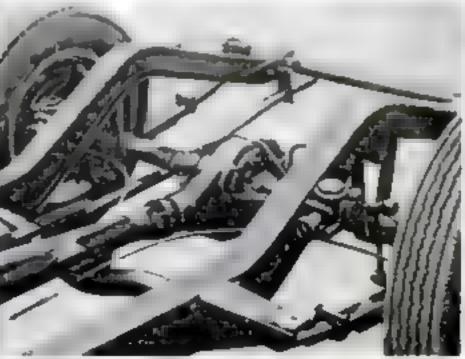


Telescoping steering wheel, shown retracted above and extended at right, permits tailoring car to driver. Car, shown here with right-hand drive, is now available with left-hand drive.

Twin S-in. dials are speedometer and combined clock and rev counter. Grouped dash controls include horn button. Transmission has four speeds forward; rear axle uses 5.125 to 1 ratio.



Engine is still 4-cylinder, 54-hp., unchanged except for T-shaped air intake connecting dual carburetors with single filter. Note built-in tool chest at left, large 12-volt battery in rear.



New box-section frame is upswept over rear axle to increase ground clearance. Rear springs are leaf, as before, but slightly softer. The wheelbase is 94 in., over-all length, 145 in.



How a concrete building lifts itself by its own bootstraps is shown in the senes of pictures above, made from the same location during the

construction of the radio relay station on Troy Hill, near Pittsburgh. The first photograph (far left) was made on a Wednesday, when the huld-

# TV Towers Sprout from Sliding Form

TOWERS that were raised by their own bootstraps will be relaving television shows cross-country this fall. Part of A.T.&T.'s New York-to-Chicago chain of radio relay stations, they were built with the help of an unusual wooden form that rises with the structure, sliding up as the concrete in it hardens.

Ordinarily, concrete buildings are poured one level at a time, the forms being knocked apart and reassembled for each higher level. Here, though, the sliding form stays together until the building is finished. It rides on 20 threaded steel rods that make up part of the vertical reinforcement of the structure. Screw jacks on these rods raise the form about six inches an hour. Since

the concrete must be poured continuously, work goes on day and night

The sliding form consists of three wooden frames, two small ones fitting inside the third large one. Concrete poured into the space between the large frame and two small ones makes the outside wall. The space between the two small frames makes an inside wall enclosing the stairs.

The continuous-pouring method was employed by A.T.&T.'s Long Lines Department for much of the eastern leg of the 31-station New York-Chicago relay chain. While built primarily to relay television shows on its searchlight like beams of micro-waves, it may also be used to carry great numbers of long-distance phone calls.

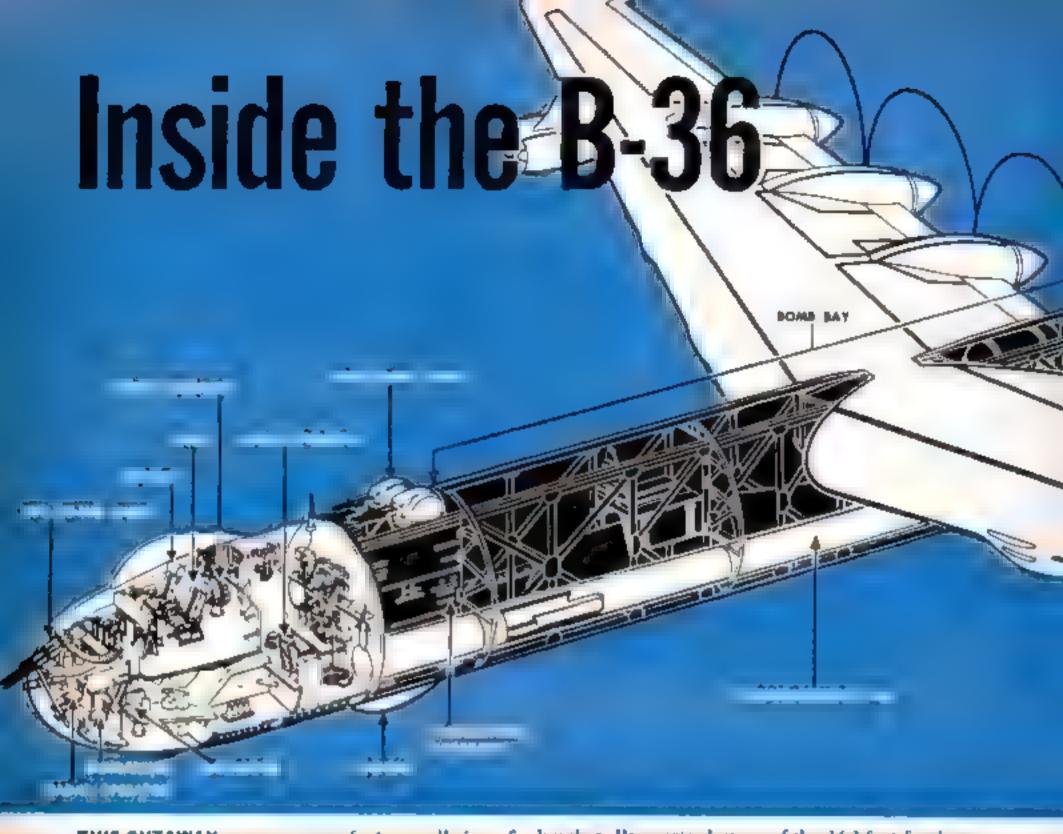


ing was only 16 feet high. By the next Monday (see aid from right) at had reached its full height of 163 feet. Photo at tar right shows the

structure completed, but before installation of huge horns that serve as automias. Lower is one link in New York-Chicago television relay.

Scaffolding hanging from the sliding form supports a "finance," who smooths concrete as it is incovered by the form. The workmen's platform at p the structure also rides on the form Form rises about an inclinit at the is workness operate tacks litted to threaded steel bars. Note saidsticks placed behind threaded bars to aid in keeping platferni level as it moves up.





THIS CUTAWAY gives you your first over-all view of the interior of the Air Force - B-36 intercontinental

bouther. Pressurized areas of the 162-foot fuscinge are shown in white. Designed to carry 10,000 pounds

#### By John F. Loosbrock

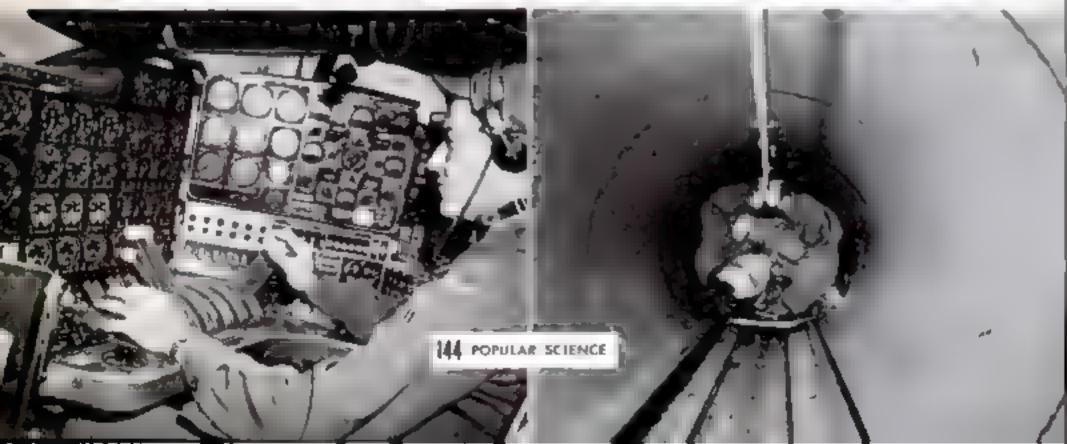
BACKBONE of the U.S. Air Force's Strategic Air Command, the Convair B-36 is the world's biggest bomber. Here for the first time, a cutaway sketch and

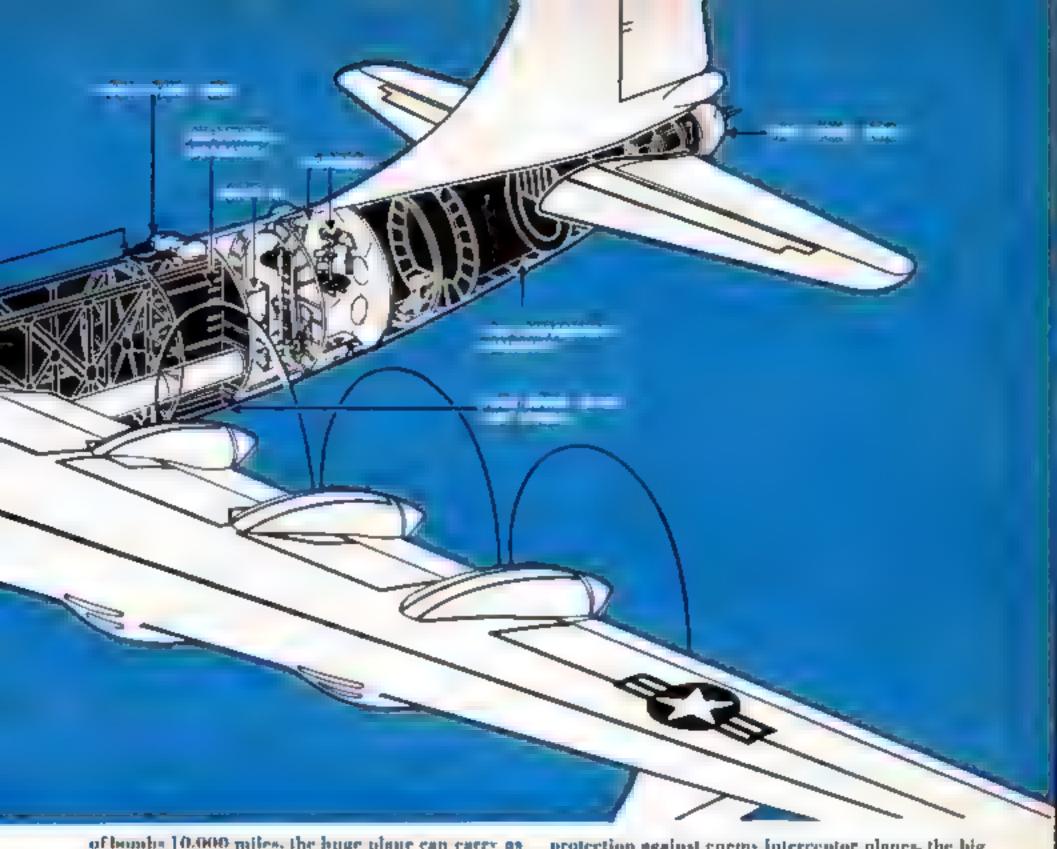
FLIGHT ENGINEER on the B-36 keeps an eve on the bewildering across of gauges and controls that harmess the six 3-500 hp, engines. On late models, four 5,200-lb, thrust jet engines give added speed.

photographs are combined to give you an uside look at this sky grant

Its 13-man crew rides in pressurized comfort even at altitudes up to 50,000 feet. The plane carries its own subway, an 87-foot airtight communication tube, 30 inches in di-

FORE AND AFT PRESSURIZED SECTIONS are empered to an B7-foot-long pressurized to nell terminent ride through it by lying on a four-wheeled eart, pulling themselves along a cable. Cart cans on rails,





of bombs 10,000 miles, the huge plane can enery as much as 84,000 pounds for shorter distances, For

protection against enemy interceptor planes, the big Consur homber mounts sisteen 20-non, cannon,

ameter, that connects the front and rear pressurized crew compartments. The rear one has six bunks, where crewmen sleep during long flights.

In the air, the B-36's skin is sleek, unbroken by protruding gun turrets. These re-

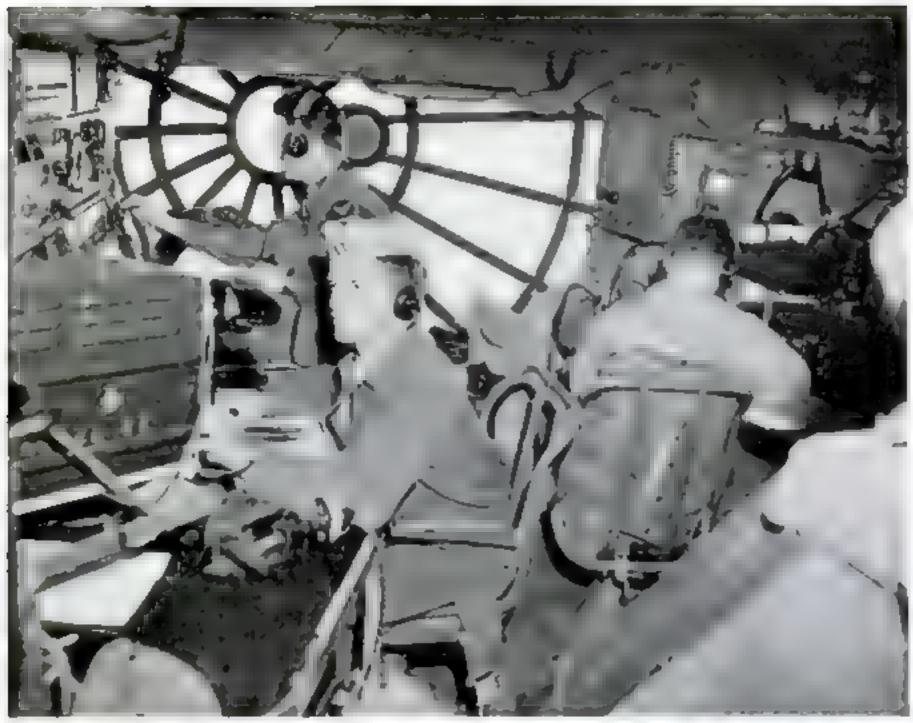
tract during flight and are elevated when the bomber reaches hostile territory

The big bomber's sixteen 20-mm, cannon are mounted in eight turrets, fired remotely by a GE central fire-control system. And future experiments may replace these guns

PHOTO SHOWS two sirmen working on part of the intricate equipment in one of the bomb bays. Have have retractable doors that slide up inside fuselage, instead of dropping down, when opened-

DURING FLIGHT, crew members stand by at their stations in rear section Scanners, with carpliones, watch for trouble that pilot might not see. Off-duty crewmen can map on the six bunks in compartment,





IN THE NOSE, directly beneath the pilot's compartment, sit the rador operator, navigator, and bombardier. Under new USAF training program, any of

these men can handle duties of other two in emergency. Above them, just in front of the pilot, two of the plane's sixteen 20-mm, cannon are mounted.

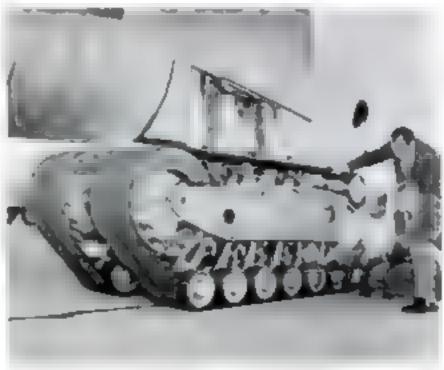
with rocket launchers, putting bomberfighter tactics in a new light.

Also on the books, as part of the campaign to make the B-36 Superbomber faster and more deadly, are drastic design changes.

Wings would be swept back sharply and turboprop engines would replace the present reciprocating, pusher-type. This would enable it to exceed its present announced top speed of more than 435 miles per hour. END



THIS PHOTO SHOWS airman checking a portion of the maze of wiring that is interfaced throughout the bomber's fuselage. Unpressurized areas such as this are inaccessible during high-altitude flights.

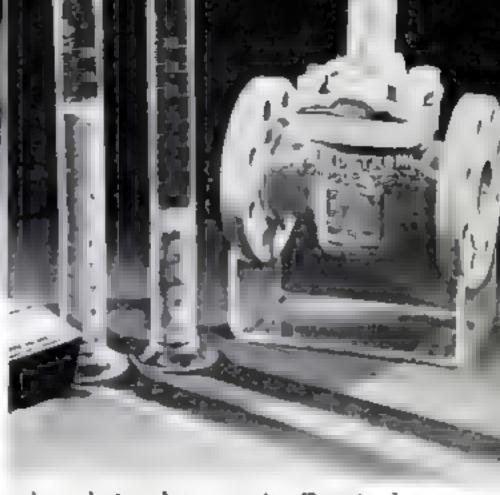


LATEST EXPERIMENTAL ADDITION is tracked landing gear. Weight cests on bogic wheels that roll on two endless belts. This spreads weight over greater area, so plane won't sink in soft runways,



#### New Grease Is Compressible

SEMINGLY contradicting textbooks that say liquids are incompressible, lubricant in the sticks of grease above can be compressed under pressure. Graduated receptacles compare amount of new Rockwell Hypermatic lubricant (left) and of a standard lubricant that can be squeezed into valve at far right. Pressurized, the new type becomes self-feeding, and automatically lubricates



valves designed to use it. Entrained gas partly explains its compressibility, the maker says; the rest is his trade secret.

#### Glasses Dim Sun to Taste

ADJUSTABLE sun glasses, shown below, become darker or clearer to suit the light when you move a pair of metal control tabs beneath the unbreakable-plastic Polaroid lenses. Each lens consists of front and rear light-polarizing elements, the front one fixed and the rear one rotated through 90° by the tab. According to their relative position, any desired graduation between transparent and opaque is obtained.

#### Hot Cargo Rides Wing Tipe

SPECIAL compartments built into a plane's wing tips safely transport radioactive isotopes manufactured in Britain's atomic pile at Harwell, England. Except for carrying the isotopes to and from the plane, the heavy, lead-shielded containers, required when the "hot" materials share cabin space with passengers and cargo, are no longer needed. Below, a shipment is loaded with tongs for delivery to South Africa



JUNE 1950 [4]





# How They Make Your Cups and Saucers

The potter's wheel has been motorized, but mass production of modern American chinaware still takes skilled hands.

By George H. Waltz, Jr.

PS photos by W. W. Morris

IF YOU happened to overhear a group of men talking about such things as "biscuits," "mixers," "cakes," "saggers," and "jiggers," no one could blame you if you thought they were bakers. But you'd be wrong. If you asked them what sort of work they did, they'd tell you they were "pot makers." If that one stopped you, and you asked again, they probably would explain that "pot makers" was just a short name for pottery makers, and that they worked in a plant turning out china plates, cups, saucers, and other tableware.

PS photographer Bill Morris and I were introduced to the quaint jargon of the pot makers recently when we visited the Jackson Vitrified China Company's plant in Falls Creek, Pa. We learned that "biscuits" and "cakes" weren't edibles, that "saggers" didn't sag, and that "jiggers" weren't dancers or small glasses. We also learned that although modern American china may be formed on mechanized potter's wheels, be fired in a modern continuous gas-fired tunnel kiln, and get its outer coating of glaze on an automatic glazing machine, the process still requires the skilled hands of many workmen.

The china dishes that your wife sets out on your dining table three times a day started out in life as a carefully blended mixture of clays, feldspar, flint, and water. Pot makers like to compare the mixtures to the human body (they even call it "body") with the various clays forming the flesh, feldspar the muscles, and flint the bones. Although each manufacturer has his own secret formula, the differences are largely a matter of proportions.

Oddly enough, in any one china plant the same cent-and-a-half-a-pound mixture that goes into making thin dinnerware for the home also is used in producing the heavier and less expensive ware for hotels and restaurants. The difference in cost lies in the increased difficulty in making the finer cups, plates, and other dishes thin, and in their decoration.

Busically, there are five main steps in the manufacture of china—preparation of the body mixture, shaping, drying, firing, and decorating and glazing. Cups, saucers, plates, and other simple forms are shaped by "nggering" the plastic clay mixture into molds on a motorized potter's wheel. More complicated forms, such as gravy boats, are cast in multipart molds.

Careful firing is one of the secrets of good china. Firing in a modern tunnel kiln is a continuous 24-hour-a-day process. The china, still in its partially dried clay state, is placed in fire-resistant receptacles called "saggers," which in turn are stacked on kiln cars. The cars are loaded into the entrance of the kiln at proper time intervals and a hydraulic plunger pushes them along. As each car leaves the kiln's discharge end,

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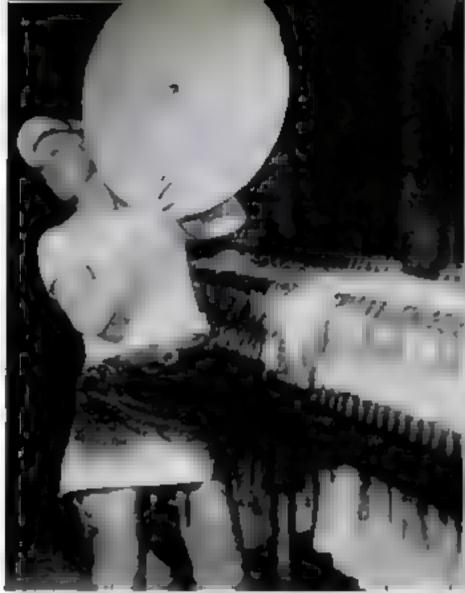
In hand painting stripes on a china cup, worker places it on a turntable, which she rotates.



Body mixture for American china consists of clays, to dispar, and that. Each ingredient for a batea is carely by weighted out and show ciled into gigantic, motor-driven mixers.



2 Water is added to the mixture. After care-ful blending the mixture is passed Dirough fine screens to remove any coarse in aparities. In this state, the maxture is called "slip."



3 From storage tanks, the shp is pumped under pressure into filter presses, which press the excess water out of the slip and form the body mixture into large disklike "cakes."



4 The cakes then are worked and kneaded in a pugmil. The mixture is blended, compressed, and forced out through a nozzle to form sausagelike slugs. This is called "pugging,"



6 Jiggering. The mold with its bat then is placed on a motor-driven potter's wheel, where a steel profiling tool mounted on a hinged lever shapes upper side of the bat.



7 Machine Jiggering. Small-size plates also can be shaped on semiautomatic pagers Molds with bats, placed on machine's spindles, are shaped and trimmed automatically.

During its slow progress through the kiln, a number of physical and chemical changes take place in the body mixture. First of all, the remaining water is driven off. Then, as the temperature increases toward the maximum, the feldspar begins to fuse, and the clays start to decompose to form a new silicate. The latter crystallizes into tiny needle-like structures, and the flint begins to dissolve. In effect, a glassy matrix is formed

within the material. As a result, the claystate cup, saucer, or whatever that entered the kiln fragile and porous, leaves it strong, dense, nonporous, and nonabsorbent.

Strangely enough, the decorating end of the china industry was one of the first to feel the repercussions of the A-bomb Before the war, a material known as uranium oxide was used to produce yellows. Vanadium oxide is now substituting for its more famous brother.

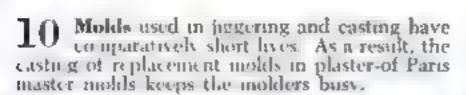


5 Batting out. This is first step in the actual making of a cup or a plate. A himp of body mixture is placed in the macline visible in lower left-hand corner of photo above, and pressed

into a flat pancake or bat. The worker then picks up the bat, raises it up high, and slaps it down hard on a ptaster-of-Paris mold of the particular piece to be formed.



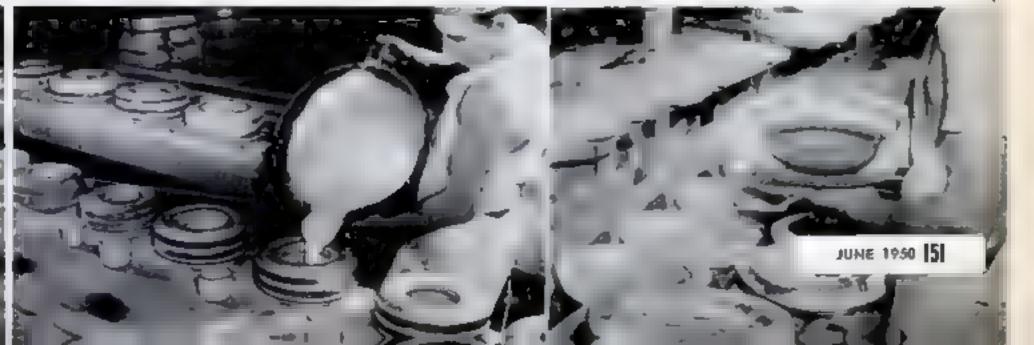
8 Cups are aggered out in much the same way as plates. However, they must be imished on lathes. Because the body mixture contains flant, tools must be sharpened frequently.





9 Handles for cups are cast separately and, after being trimined by hand with a knife to fit the double curves of the cup, are comented in place with liquid body mixture.

11 Intricate pieces, like gravy boats, cannot be piggered, but must be east in multipart molds. Body may is rande bound for casting by using chemicals that add a little water.





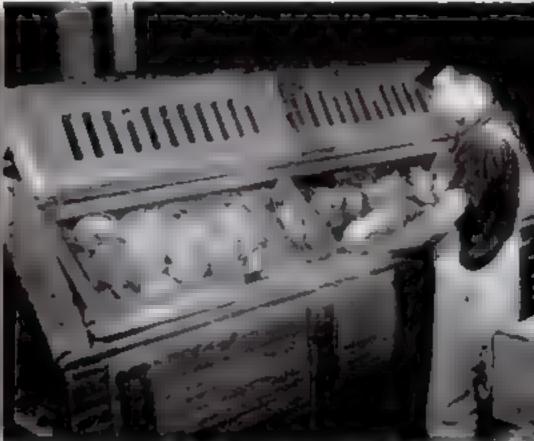
12 Plates, like all ware at this street are free h. T. keep tacin in stage during firing, said, or still he intered as placed between rans. This is called bedding



13 Before bring, the war stall made trade to set the search and in the resistant to the last set of the search as stated as knowns.



16 Shrinkage. The cop at the top is still in the clay state before bring. The cop at the bottom has been fired. Shrinkage from mording through large tals 125 percent.



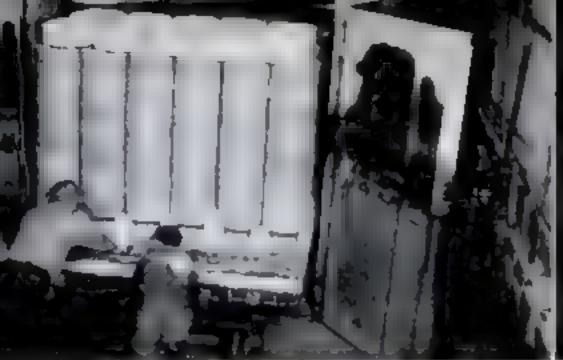
17 Bescuts, as fired pieces are called, are so to ign that they can be surethed down by to obling them in long motor-driven drains partially had wall broken pieces of china



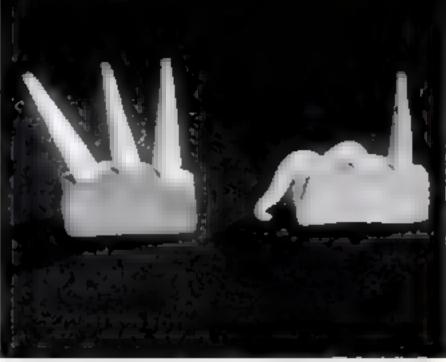
20 Machine glazing. Some pieces can be materally while betters of spray gons spreads on the liquid glaze. Her glaze also is fred



21 Emisting. Any state in perfections in the glaze such as marky caused by the plates in suggers during glaze bring, are removed by grinding.



14 Into the tunnel kiln for 65 hrs, of fring. As cars progress through kiln ware is subjected to rising temperatures until about 2,200° F, is reached. Then it is cooled.



15 Pyrometric cones placed on kaln cars give a double check on recording pyrometers in control room. Melting I comes, as at the right, indicate maximum transcriptore reached.



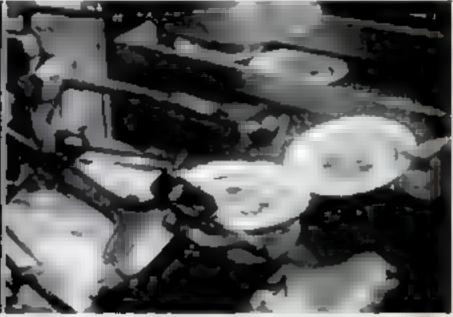
18 Underglaze decoration. Decorations using the table tandes that can stand light heat can be applied before piece is glazed. These are printed on with hthographic transfers.



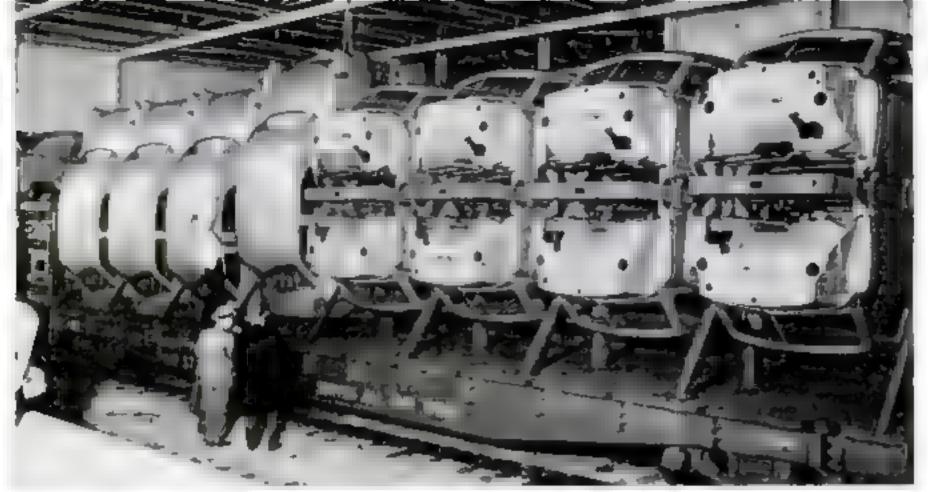
19 Hand glazing is il in by dipping the bisof glass. Pieces then are fired at 2,000° fer 21 hours or more to meet the glaze.



22 Overglaze decoration. Decorations using metallic oxides that cannot stand high temperatures are applied over the glaze and fired separately. Decalcomanias do the trick.



23 Gold edging and stripes are applied by machine. After firing, the gold is burnishing stick made up of tiny glass fibers.

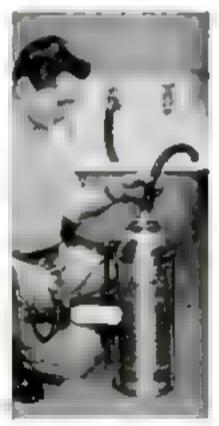


#### Flatear Upends Auto Bodies

A special mounting on the flatear above allows auto bodies to be locked in pairs, belly-to-belly, like the eight shown at right. Then the mounting device "pinwheels"

them so that the bodies will ride vertically, tail end up, like those at left, with their noses protected. In this way twice as many cars can be carried as in a conventional auto boxcar. The system was devised by Union Pacific and Kaiser-Frazer engineers.

#### CO: Triggers Extinguisher



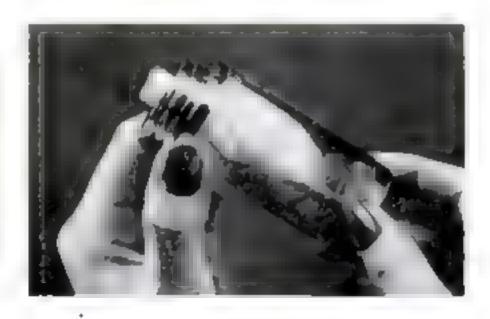
Tills new stainlesssteel fire extinguisher doesn't have to be recharged from time to time as do the sodaacid ones. Only after use does it have to be refilled with water, as at left, and a new CO. cartridge inserted. To use the Pyrene extinguisher, it is turned upside down and banged on the floor. This releases the CO... forcing out a 40-ft. stream of water

#### Sprayer Carries Own Power

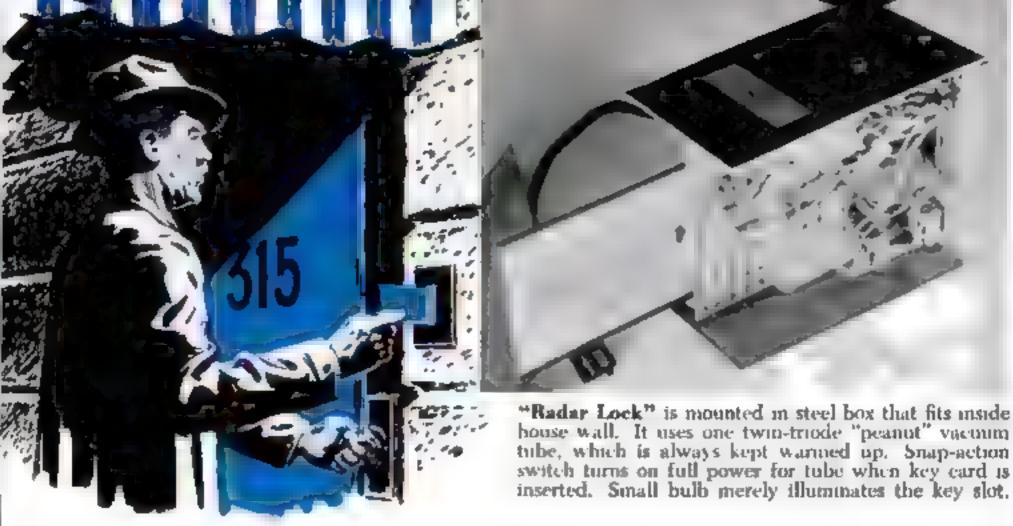
THE compressor goes right along with this compact spraying outfit. Electrically operated, it has a nozzle pressure of at least 25 lb. per sq. in. Offenbach and Reimus, San Francisco, makes the Spraymaster.

#### Twist Puts on the Squeeze

The turn of a cap on the bottom of Twistube, shown at right, squeezes a flexible plastic sack inside a hard container. And out of the top oozes just the right amount of toilet cream or paste. Among advantages of the new gadget, made by the General Cap and Container Corp., of New York, are that the outside cylinder always retains its original shape, and every bit of the contents can be squeezed out.



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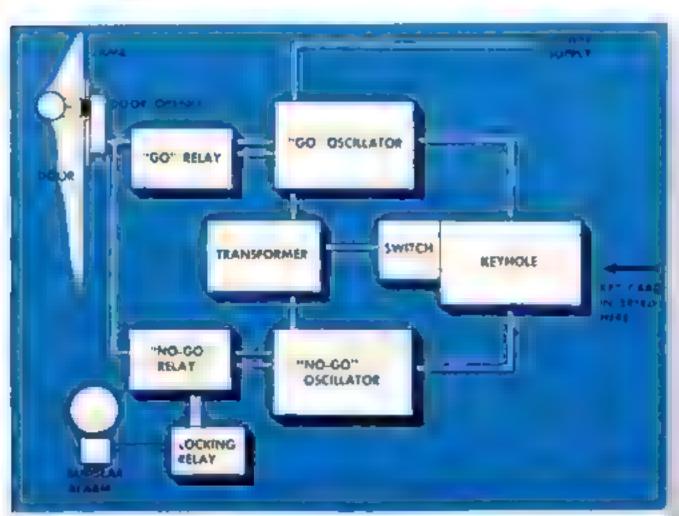


## Card Opens Electronic Lock

IT LOOKS like an ordinary wallet-size identification card. You slide it into a slot near the door—and the door unlocks! The eard is a key; the slot, an electronic lock.

One of the inner layers of cardboard that make up the key has several strips of graphite. If these strips are the same pattern as strips of silver inside the lock, the door opens. But if someone tries the wrong key or a sheet of metal—the door stays locked.

The silver strips in the lock form one plate of an electrical condenser. The graphite strips in the key form the other plate. The capacity across the two plates loads a vacuum-tube "Go" oscillator, drawing current and tripping a relay that controls a standard electric door latch. If anything but the right key is used, a different "No-Go" oscillator is loaded, tripping a relay that breaks the connection to the latch.



Block diagram shows components of lock made by Electronic Lock Co., Hollywood, Calif. At far right are key layers—from top down outside sections, sheet with graphite streps, lightproof paper. Lock can be set so wrong key sets off a burglar alarm.



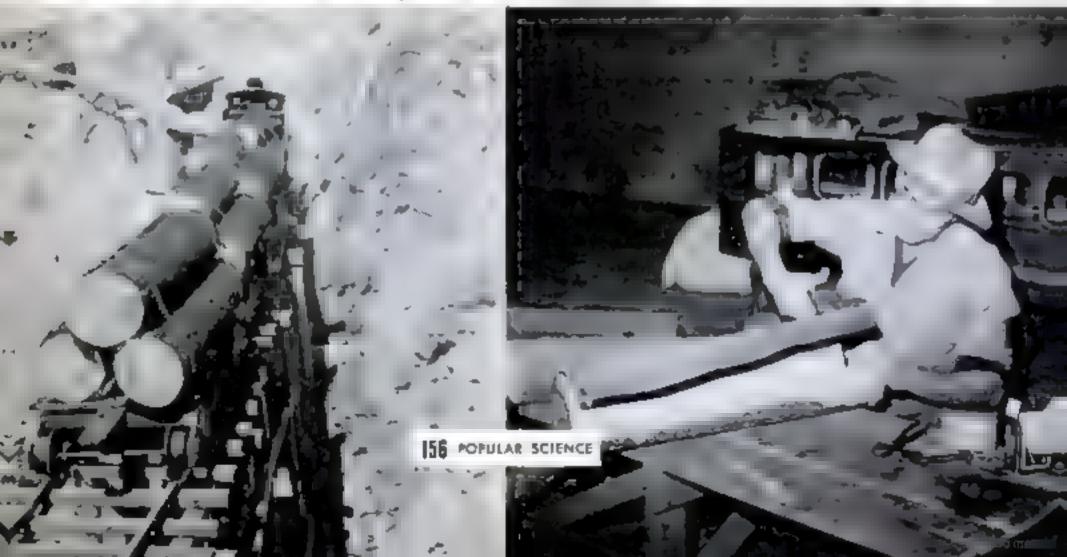


longing train races t ward in and trestle while

A regio and dollies it and out like printings.

For movie, toget 2 tr in r lb dag 200 feet of Sin truck will worken rile feel that arried s on eight 3-in a ywood wheels. Here Mixer is adjusting this clear is building logs in place

Real logs would be too heavy a load for trestle so hollow they are made by to king 1 16 m. chip board around circular end brocks penting it brown and then ghang on shexings for back



## He Builds Thrills Into Home Movies

#### By Andrew R. Boone

I JOLLYWOOD has nothing on homemovie hobbyist Ray Maker. When it comes to creating realistic scenes and unusual effects, he can give the dream-merchant professionals a run for their money.

For the past 15 years, Maker has been calmly turning out feature-length western thrillers from the pint-sized basement studio of his Oakland, Calif., bungalow. His total to date is an even dozen 50-minute sound

films, most of them in color.

Commicks make his movies, and Maker makes the gimmicks. For one picture, a sagaof the timber country, he built a miniature steam locomotive, seven log cars, and 200 feet of track and trestle-then promptly blew them all up to make one of the movie's exciting scenes. This was only the beginrung. To change a barren, rock-quarry setting into real timber country, he had to transplant 30 small pine trees from a mountainside 100 miles away. Even the logs had to be specially made-real ones would have been too heavy for the frail trestle.

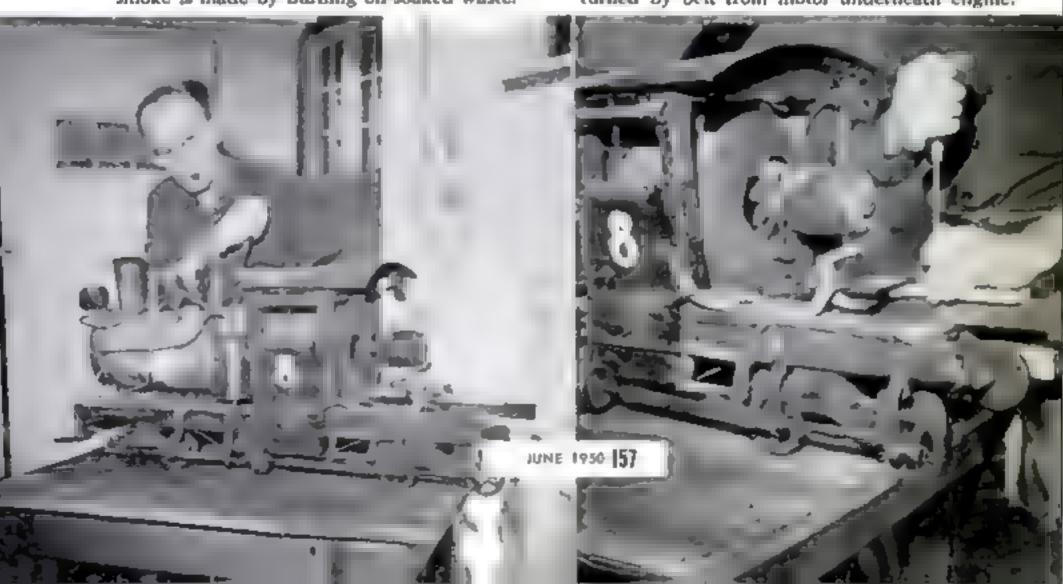
Model locomotive, patterned after Shay type used in logging, is 40 in long, weighs 75 fb. Boiler develops 15 lb. of steam. Heavy black smoke is made by burning oil-soaked waste.

But Maker isn't content with outdoor scenes and long-distance shots. He likes to vary these with close-ups and interior scenes. For these he moves into his cramped basement. Here, squeezed within its narrow walls, are a small stage, cutting room, glassed-in projection booth, and assorted cameras, lights, scenery flats, sound-recordmg equipment, and special-effects gadgets. Six cameras give Maker a wide range of views and effects. To carry the current load of his lights, additional lines are brought in from two neighbors' homes.

A car-top maker by trade, accustomed to working with his hands. Maker has become expert at turning simple materials into evedefying props. For the logging picture, he built a full-scale replica of the locomotive's cab out of wood and cardboard. Then he started his cameras, jumped into the seat, and spent several seconds peering intently down a track that wasn't there. A view of the swaying tender and log cars in the background, projected onto a screen behind him, completed this dramatic close-up.

In one movie, a courtroom scene re-

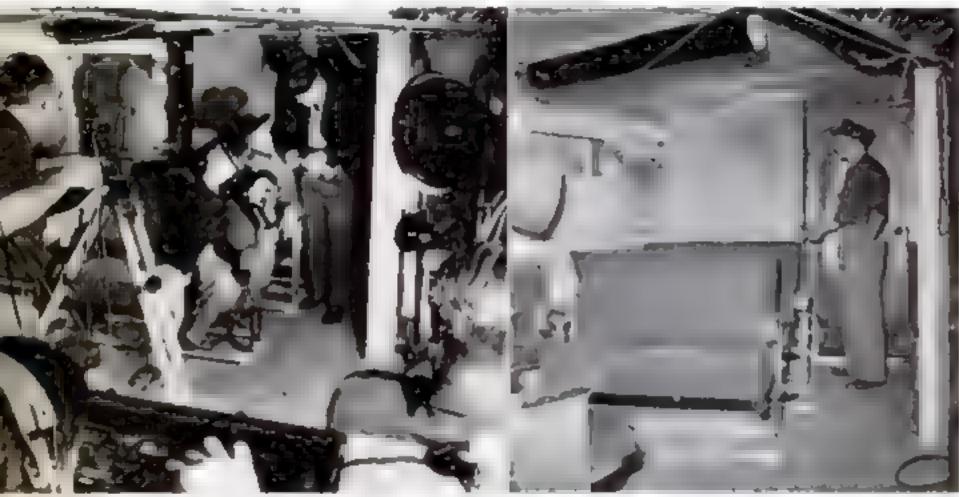
Small auto-heater fan, powered by 6-volt bat-tery, acts as blower to force draft in firebox. Egg-beater gears on side are dummy drivers, turned by belt from motor underneath engine.





For close-ups showing villains planting powder to blow up train, Maker built nearly full-scale trestle 20 feet long. Actual explosion was light charge with chemicals to make smoke.

Imperited engineer peers out from wood-andcardboard replies of locomotive cab built in Maker's basement. Movie of hirching tender and cars is projected onto screen behind him.



For another movie, Maker rigged up interior of railroad ear patterned after old Virginia and Truckee coach. Part of controls for sound-recording equipment can be some in the recording

Three seats in a painted flats are only propsused to creat in less of old-type coach, but they do the trick. Door in backer und is just knob, but sound caracta will pick up its click

quired that the judge be at one level, the prisoners at a lower level, and the spectators at a still lower level. Building a three-level stage under the low, 6%-foot ceiling would have been impossible. Maker solved this by having the judge sit high, the prisoners kneel, and the spectators sit on the floor.

In another picture, three seats and some painted flats made the authentic interior of an old-time railroad coach. The country-side flashing past the windows was a movie projected onto a screen in the background. Offstage, a burly assistant jumped up and

down on an inflated air cushion connected by tubes to air bladders under the coach seats. The passengers jounced realistically. Whistle toots and wheel clicks, recorded months earlier, were picked up from a nearby wire recorder.

Many of Maker's gimmicks come straight from Hollywood, and what he can't duplicate he improvises. By combining mechanical tricks with creative know-how, he can do most of the things the professionals can do—and sometimes better, say his enthusiastic audiences of friends and local clubs.



#### Craiser at Home on Land or Sea

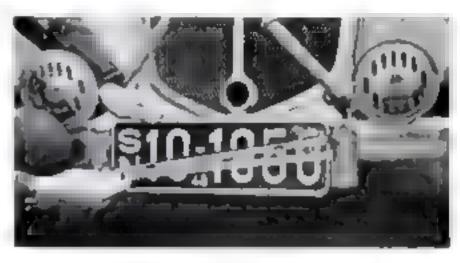
Picnic base ashore or a fishing trip on the lake is all the same to this 16-ft, outboard cruiser. Built-in retractable wheels enable it to be towed behind the family car as a house trailer, complete with bunks and galley. The bonded-plywood hull has a flat, double bottom for easy launching and beaching. The American Standardized Building Corp., Chicago, makes the Holiday to sell for around \$1,000.

#### -lig-Saw Plate Traps Auto Thief

Strown at a German inventors' fair in Munich, the license plate at right was invented by Ernst Descher to trap auto thieves. After parking, the owner would remove a thin section running diagonally across the number. Result: a "cancelled" plate that police could easily spot should a thief decide to take a spin around town.

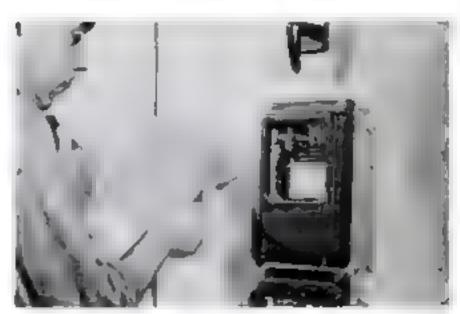


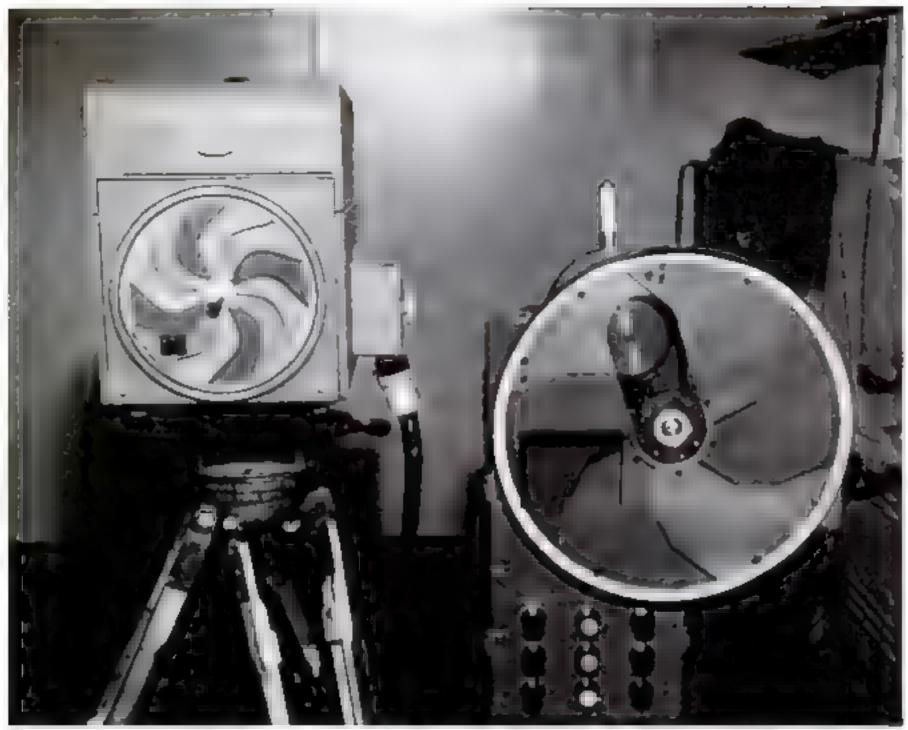
It's a new kind of clothespin, made of springy plastic. To clip laundry to a line, you pull open overlapping section of ring by squeezing the triggerlike crosspiece toward the opposite side of the rim with forefinger and thumb. Jiffy-Grip sells at 490 for two dozen.



#### Sprayed "Skin" Protects Paint

A RUBBERIZED plastic coating protects the newly painted surfaces of instrument panels at the East Pittsburgh plant of Westinghouse Electric. Applied with a spray gun on the production line, the transparent covering prevents dirt and scratches during shipment and installation. It's then peeled off like a banana skin, as seen below, leaving a "factory-fresh" appearance.





Camera (left) and viewing monitor (partly disassembled to show color disks) are main parts of

Do Mont wired color system. Additional, larger viewing screens can be connected to monitor.

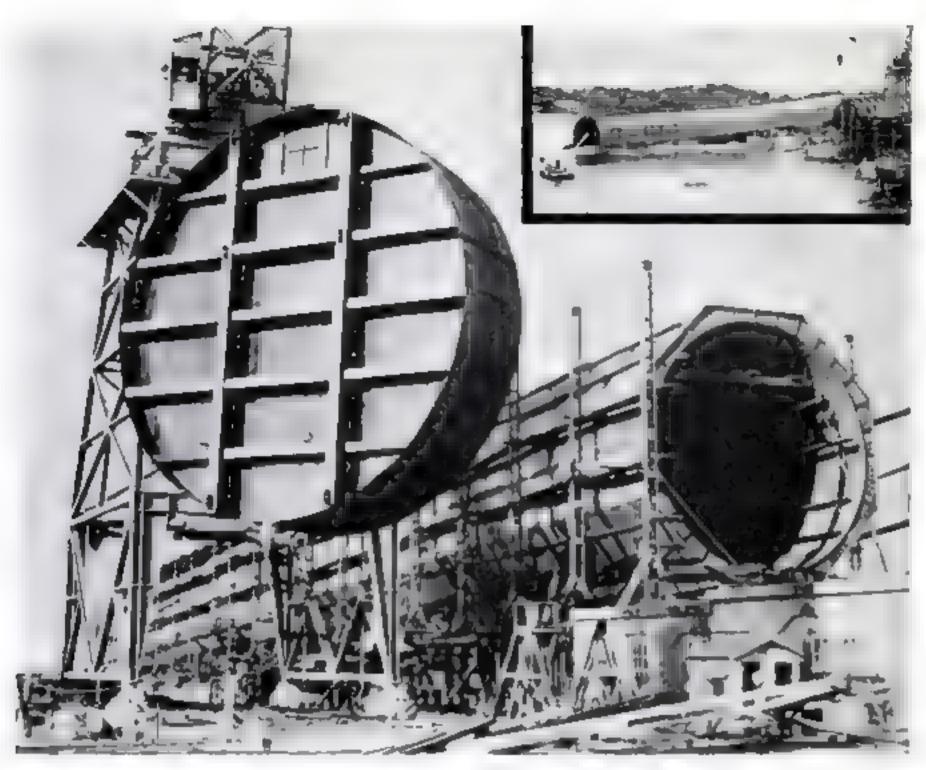
## Industry Gets Detailed TV Color by Wire

A COLOR television system that retains all the fine detail of present black-and-white TV has been developed for industrial use by Allen B. Du Mont Laboratories. It cannot be used for broadcasting, however.

The Du Mont system uses spinning disks in the camera and receiver to provide a rapid succession of red, green, and blue images that fuse into a full-color picture. This is similar to the proposed CBS system. But since the Du Mont pictures are carried only by wires, they need not be coarsened to keep the frequency band down to the FCC-set 8-mc. limit, as must broadcast color TV. The new system, which uses an 18 mc. band width, is expected to find wide use in showing operations—color helps distinguish details of a surgeon's work.



Bringing fashion shows to customers on many different floors of department store is one proposed use for new system. Momitor (far right) shows what customers would see on big screens.



#### Tunnel Launched Like Ship

That's not a new kind of ship on the ways —it's a tunnel. Four of these 375-foot steel tubes form the Washburn Tunnel under the

Houston (Tex.) Ship Channel. Above, a bulkhead swings into place to seal the end before the section is launched (inset) at Pascagoula, Miss., floated to the site, sunk in a trench, and embedded in concrete.



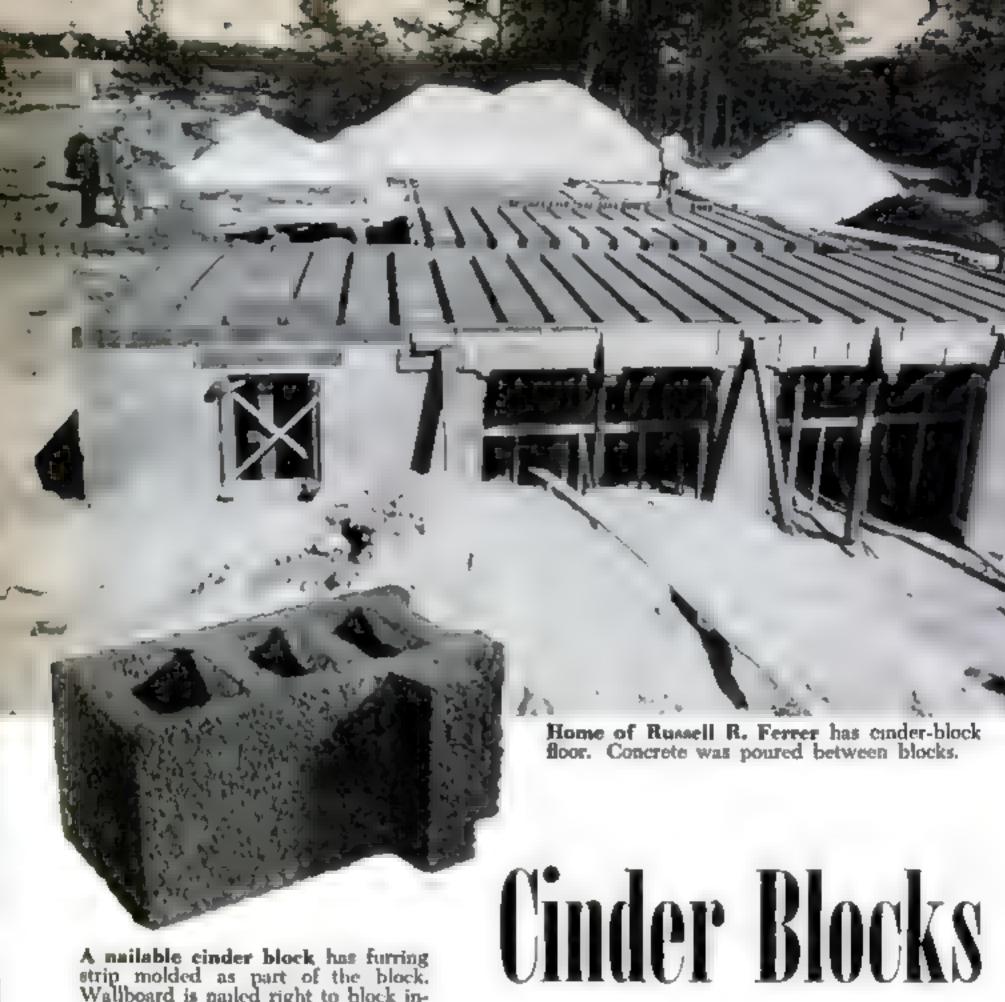
#### New Chemical Kills Fire Fast

A GASOLINE-SET fire of electric wiring was put out in less than a second by the new chemical being demonstrated above. Army Engineers say it is twice as effective as carbon tetrachloride and cheaper because so little is needed to put out a fire. Called bromo-difluoro-methane, it can be sprayed from a standard fire extinguisher.



#### Helmet Gives Rear View

RIVALS trying to overtake Pete Rannie, British motorcycle racer, won't catch him unawares. To keep an eye on what's behind him, as well as what's ahead, he has devised a rear-view helmet. Now, without turning around, he can watch his trailing competition through a mirror conveniently mounted on brackets attached to his headgear.



Wallboard is nailed right to block instead of using wooden furring strips.

A new type of block, plus new

#### By Benis Sneigr

PS photos by W. W. Morris

**DECENT** developments in cinder blocks ■ are stepping up home construction.

A new type of block has a furring strip molded as part of the block-eliminating wood furring strips to support wallboard. Another new angle is the use of curder blocks as floors. Here they sometimes have a double purpose-the holes in the blocks serving as conduits for forced hot-air heating through the floor.

In the home of Russell R. Ferrer at East Patchogue, N. Y., described here, the blocks were used as an ordinary floor-laid on temporary forms at the first-floor level over a basement. The blocks were put down with a 4" space between each row of blocks. Two X" steel reinforcing rods were set in each 4" channel and concrete poured in. Then a 2" mixture of cement and cinders was spread over the entire surface to form the floor of the house. This was kept flooded for a week to keep it from drying too fast. After the cement had set, the shoring beneath the floor was removed and later used as attic framing.

The basement walls are concrete blocks and the upper walls cinder blocks. Plastic



Cost of finished house-less accessories-was \$10,870. Only parts on exterior of house that

will ever need painting are the wooden gutters and leaders. Windows are aluminum,

# Speed Home Building

uses for standard blocks, are helping lick housing shortage.

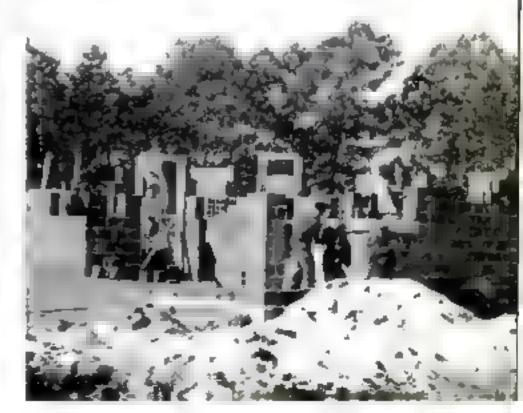
cement was coated on the outside of the basement walls and inside the cinder-block walls to waterproof them. The outside of the upper walls was coated with stucco.

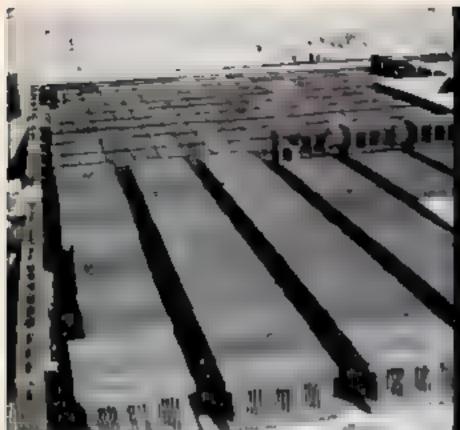
To cover the cement-cinder floor, inlaid hnoleum was used in the two bedrooms; asphalt tile and carpeting in the living room; ceramic tile in the bath; and rubber tile in the kitchen.

The spacious basement houses a four-car garage, a big storage closet, a utility room, and another room for a shop and darkroom. The house has four rooms and a dining alcove—a total of 1,360 sq. ft. of floor space, including the 7'4" by 13'8" porch.

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Walls went up fast after floor was finished. Photo below-looking toward front porch of house-shows door frames set in place as cinder blocks are laid around them.





Close-up shows details of floor. Steel rods were roc in characts between blocks. Most one call blocks kept out cement ender naviare.



View from underside of floor after shoring was removed. Wood grain and knots at shoring left their approach conder content masters.



To waterproof walls, plastic cement was used used and out. Then craside wills were tushed with coating of red stacco cement.

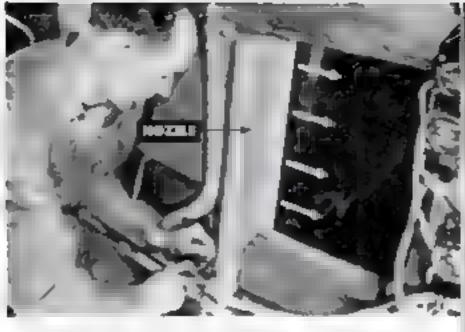


Stainless-steel molding truns all naterior doors Base of two-part morting is screwed to wall Outer part is then snapped on over base



House is treproof, retproof and hisproof Window says and frames are aluminum. Photo it left shows window when house was partially

completed. At right is same window after house was completed. Interior walls are finished with wall beard and covered with wallpaper.



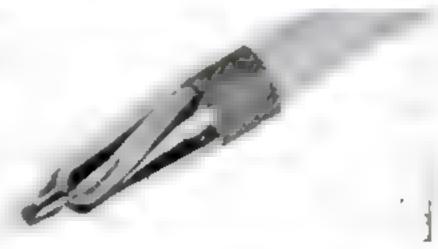
#### Acrial-Camera Ports Heated

Hor air keeps the seven optical-glass camera ports of Boeing's new B-50 photo plane free of moisture and ice. From a narrow slot in a nozzle by each window, preheated cabin air flows across the inside face of the pane (arrows). While a camera takes a picture. upper right, the flow stops automatically to avoid optical disturbance

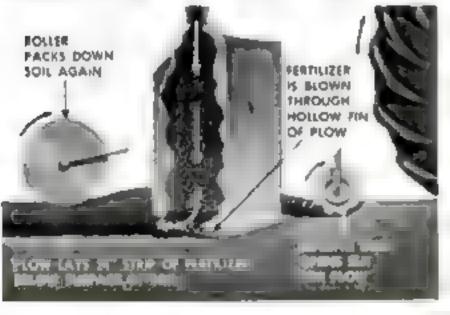


Any pencil becomes a mechanical one when the sharpener at right is kept on its end during use. A twist of the gadget instantly renews a worn-down point. The handy accessory also has a metal sleeve that encloses the lead, protecting it from breaking. It was invented by Frank J. Bambach, a metal-lathe operator, of Miami, Fla.



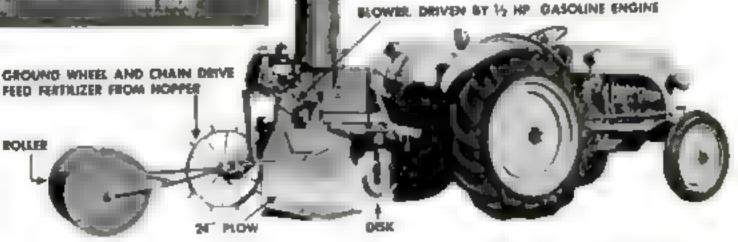


#### Machine Buries Fertilizer Without Disturbing Soll



POLLER

Up to half a ton of fertilizer an acre is laid eight inches below ground by the new subsoil plow and fertilizer distributor shown here. Developed by Hutchens Implement Sales Co., Lamar, Mo., the machine enriches pasture and row-crop land without disturbing the top soil to expose it to erosion. A %-hp. blower ejects the fertilizer through a hollow plow, a metal fin open at the rear, as shown in the simplified diagram.





Result of the remodeling job shown in the pictures on the next two pages is the girl's Gay

Nineties umbrella above. The man's cone is actually a telescoping holder for his umbrella.

# How Experts Put New Life in Old Umbrellas

An 84-year-old umbrella-repair shop shows how its workers can rebuild a beat-up humbershoot into a new one.

By C. Ennis PS photos by W. W. Morris If YOU have a storm-battered umbrella that's ready for the ash can, look it over first; it might be worth having fixed. Many broken umbrellas just need a few new parts or a cover replaced to be made serviceable again.

When an umbrella is badly damaged, it takes the hands of a skilled workman to refurbish it, as a PS reporter and photographer discovered on a recent visit to the Uncle Sam Umbrella Shop in New York. Expert in the craft of umbrella fixing, this shop has been making and repairing conventional bumbershoots since 1866. It also supplies magicians and other show people with trick umbrellas and canes. One of these is even an umbrella that makes its own rain when the user squeezes a concealed water bag.

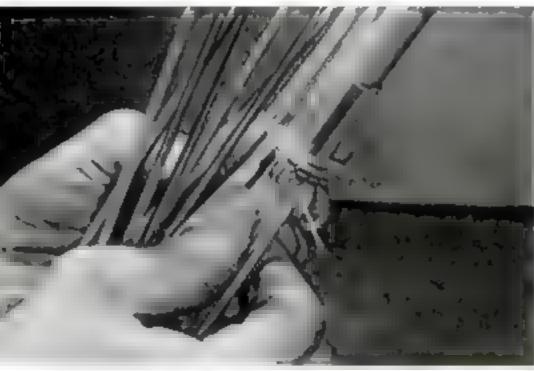
The sequence of photos on the facing and following pages shows how a woman's tattered umbrella with an attractive 18th Century heirloom handle was remodeled. The handle was retained but the frame was replaced, a new cover added, and the design changed to one of the long-stick, Gay Nineties style, again popular today.



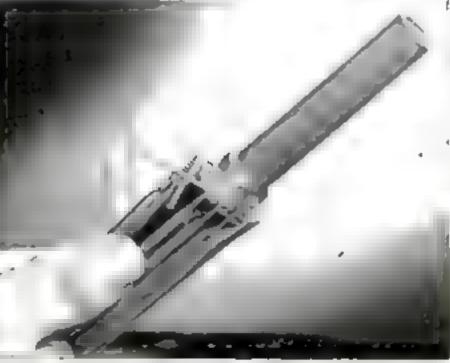
Brought to the Uncle Sam Umbrella Shop for remodeling and repair, this battered umbrella will be changed from a short-stick to a long-stick style, as shown on the opposite page.



2 To free the twisted frame from the stick, which will be retained because it is still usable, the repairman cuts the wire that fastens the ribs to a metal ring, called the notch.



3 After replacing the old frame with a new one having 16 ribs, worker threads new wire through the rib eyes, and inserts ribs into separate slots in the runner, or sliding collar.



4 At foot of umbrella, ribs are also threaded with wire, and then placed in the notch. The sixteenth rib is about to be inserted above. Wire ends will then be twisted with pliers.



5 Pressing down on a wooden pattern, worker cuts into eight thicknesses of fabric to make panels for umbrella cover. Previously cut panels are shown in the background above.



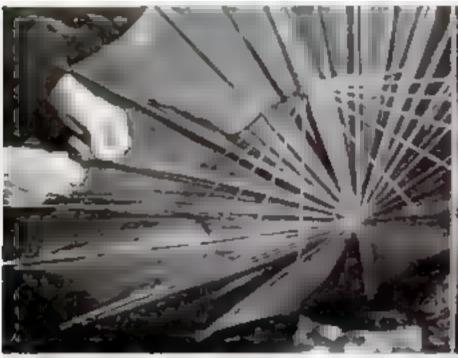
6 Worker sews panels together to make a complete cover. A metal guide, mounted in front of the machine's needle, folds fabric before it is stitched to avoid a raw edge.



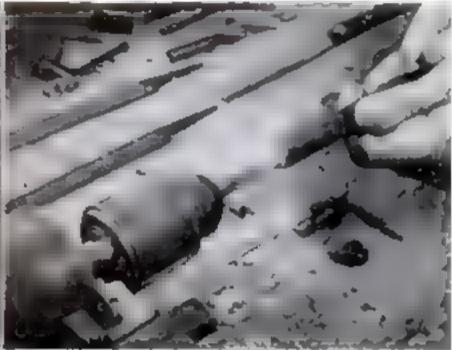
7 Metal tips that fit over the rib points are sewed to the umbrella cover by hand, above. Before sewing, scanistress pulls thread through a piece of wax to strengthen it.



8 To protect user's fingers from being pinched by the rough edges on the runner when the umbrella is opened, a circular piece of fabric called a "puff" is sewed over the runner.



9 Each rib is tack-sewed securely to the cover in two places. For the final sewing operation, another fabric puff is stitched to the center of the umbrella on the outside.



10 Whirting power drill bores hole in ebony rod, which will be fitted over umbrella stick to lengthen it. The extension rod is polished before it is attached to the stick.



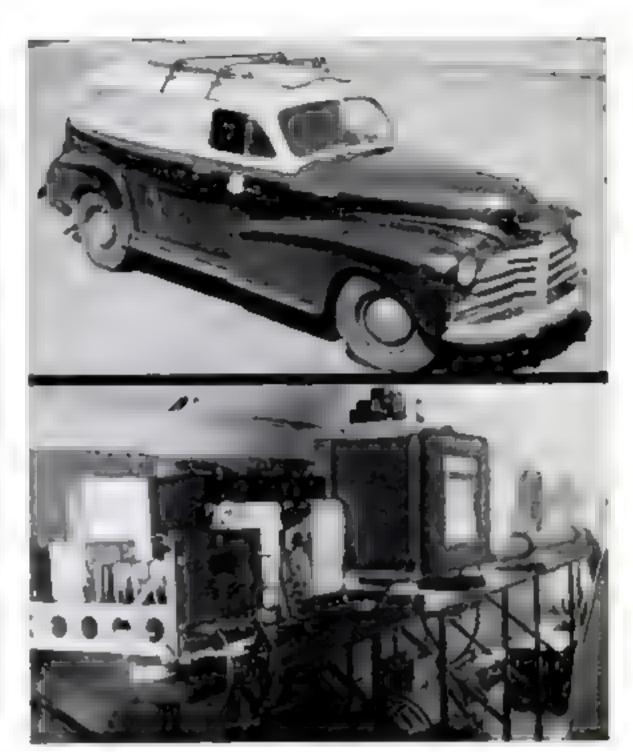
11 Before slipping the extension rod on the stick, it is smeared with glue to hold rod in place. As shown above, the umbrella's original heirloom knob handle has been attached.



12 The final step in remodeling the umbrella is to slide an abony ferrule over the foot end of the stick, so its length will be proportionate to the length of the handle.

### Planes and Trucks Speed Uranium Hunt

THE hunt for "hot" atoms is getting hotter. Planes and trucks have joined in the search for vitally needed uranium. Now scientists of the U.S. Geological Survey can explore in minutes miles of prospective uranium-ore deposits that would take teams on foot days or months to cover. The upper photo at right shows one of the trucks with two 42-inch-long Geiger tubes mounted on the roof. They can detect deposits while traveling at speeds up to 30 m.p.h. At lower right is the interior of one of the planes, which trail magnetometers that detect changes in the earth's magnetic field produced by radioactive deposits. Also, air samples are tested for radon gas, given off by such deposits



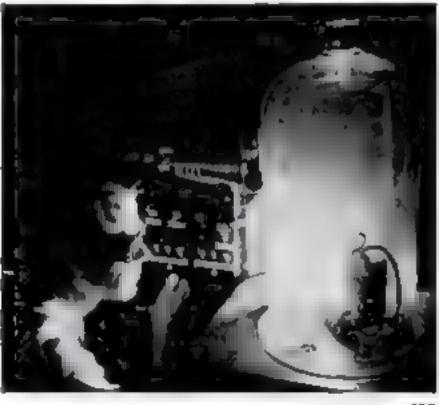
#### 12-Foot Pipe Made of Wood

You could drive a two-ton truck through this giant wood pipe. It's 12 feet across inside. Recently completed, it carries water from the Umpqua River in Oregon to the Toketee hydroelectric plant 1,700 feet away. The pipe rests on concrete cradles and is formed of staves of 4- by 6-inch redwood, tongue-and-grooved and bound with 272,-000 pounds of 3-inch-thick steel bands.

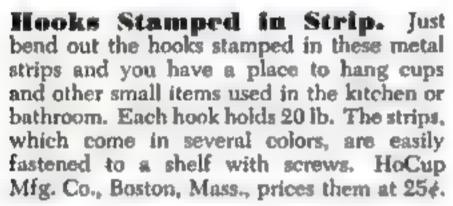


#### 50,000 Feet Up in a Bell Jar

When aircraft engineers want to find out what happens to a piece of electrical equipment at high altitudes, they simply place it in this bell jar and pump out the air. Here a switch begins to are in the thin air of a simulated 50,000-foot altitude. Results of such tests, made at a new Boeing laboratory at Seattle, Wash., help engineers trouble-shoot aircraft failures before they happen.





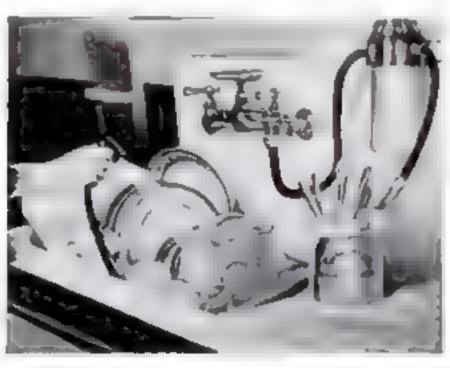




Iron at Right Height. This folding ironing board can be raised or lowered 10 inches so you can either sit or stand while you work. To lower the board, small legs underneath the ironing surface are folded down so they rest on the crossbar of the regular leg frame. Yeoman Corp., of Chicago, sells the board for about \$11.



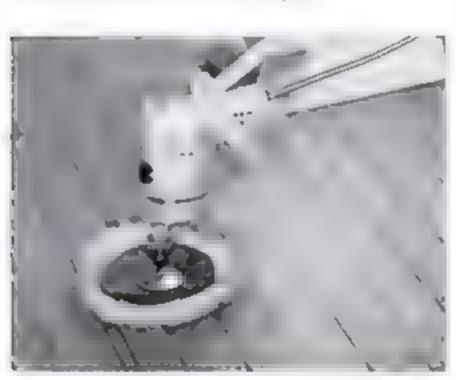
Paintbrush Kept Soft. You can seal this re-usable paintbrush bag with a match. Just place its open end between two pieces of wood, and fuse the edges, as above. Put away without cleaning, a brush can be kept soft by a teaspoonful of linseed oil or turpentine in the bag, Bauer-Lee and Co., Chicago, prices the Flash Seal bag at 25¢.



Faucet is Dishwasher. Twist a dial on the container at upper right and faucet water mixes with a detergent for spray-sudsing of dishes—all that's said to be needed for normal washing. Another turn, and water by-passes the detergent for a rinse. Spra-Matic is made by Atlantic Chemical and Equip., Co., Atlanta; sells for about \$16.



"Shoes" Prevent Ladder Slips. A ladder shouldn't slip, either outward at the base or sideways against walls (inset), with these Sta-Put abrasive-coated rubber grips strapped to the leg ends. They are slip-proof on almost any material, says the maker, E. C. Forsythe & Co., of Schenectady, N. Y., and sell for \$1.25 a pair.



Flectric Drill Becomes Floor Polisher. Fit a lamb's wool disk into the chuck of your electric drill, clamp on an aluminum lawnmower-like handle, as above, and you have an efficient floor polisher. These attachments, including a wax applicator, are priced at about \$6 by the maker, the Jonnich Co., of N. Y. and Miami.



Reel-Eze winder hung from her shoulders, this housewife's hands are free for cleaning and pulling taut a laundry line as she puts it up. With a hand crank for winding in the line when being taken down, the reel, made by Bok Machine Products Co., of Ft. Wayne, Ind., sells for about \$3.



This handy gadget is a slotted plastic cylinder that fits over the base end of a collapsible toothpaste or ointment tube. A handle enables you to empty the tube completely by rolling it up to force out the contents. The Tube Roll-Up Co., of Toledo, Ohio, makes it in six colors to sell for 10¢.



Luggage Carrier.
The aluminum case at left gives you an extra 15 cu. ft. of storage space. It is waterproof, held fast by four rubber suction cups, and is sold by Carson Machine & Supply Co., of Oklahoma City, for \$49.95.

Tubular steel bars form foundation of Kardek, below. Neoprene-faced saddles rest load on top's curved shoulders, and turnbuckle clamps anchor it to the eaves. The Miller Mfg. Co., of Detroit, is the maker.

## What's New On Car Tops

Bed Carried on Roof. It takes only a minute to remove the portable sleeping unit shown below from its car-top carrier and assemble it into the combination bedroom-tent shown at right below. Sleeping two, the bed has a steel frame, innerspring mattress, a watertight canvas top, and insectproof screening. One Minute Bed-Tent Co., of Council Bluffs, Iowa, makes it.





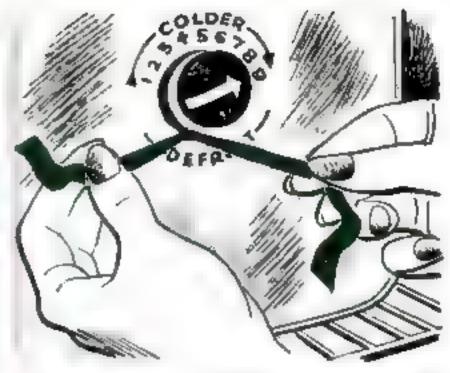


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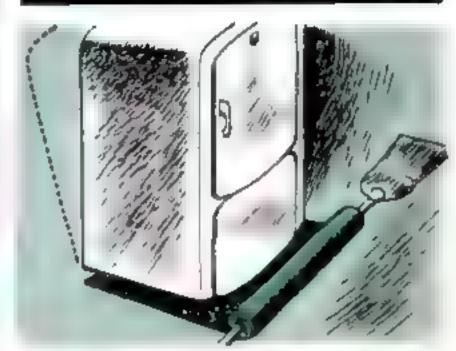
### Keeping the Home Shipshape



Give little folks big ideas by hanging a small mirror and towel rack in the bathroom low enough for them to use. If the mirror doesn't have holes, attach it with screw clips.



When you make a frozen dessert, the a piece of bright ribbon to the refrigerator's control knob as a reminder to turn the control back to normal after you've removed the dessert.



To avoid marring floors, when moving heavy objects, use a throw rug or piece of carpet. Tilt the object back to get the carpet under it. Roll the free end around a broom and pull.



An old oil heater can be made into a flowerpot holder. Remove hinged top part as indicated by arrows in the drawing. Then paint the bottom to match porch furniture.



If you want to bake one petate but don't want to light up the oven these warm months, put a jar top in a coffee can. Put the potate in the jar top, cover, and heat over a burner.

# Keeping the Home Shipshape

A simple fan guard to protect children can be made with a board-or any wooden surface-and a wire wastebasket. Invert the basket over the fan and staple the rim.



Here's an easy way to squeeze out hot compresses without burning your hands. Use a potato ricer. With the ricer, you can use water much hotter than your hands could stand.



Canned meat will slide cleanly out of the can if you place the can in hot water for a few minutes before opening it. The heat will melt the layer of gelatin or fat next to the tin.



Sewing kit for a purse can be made from an old compact. Remove powder screen and ent cardboard to fit inside compact. Wind thread around cardboard, use pull for needles.



To make gelatin without ice, set bowl of gelatin in pie tin. Put another, filled with water,

over the bowl. Drape a cloth over top tin and into bottom one. Evaporation will do the rest.

## Mechanics and Handicraft



Paint Your Own House Keep the Heat Outdoors Identify Plastic Material Give Your Voice Power

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Save time and manual labor by rolling your power tools to autdoor jobs

**PAGE 190** 



# a Hot Engine

By Martin Bunn

A nosty customer gets slow service at Dan's Grille—but unexpectedly quick service and a pair of handcuffs at Gus's garage.

TUESDAYS, during June and most of July, are usually shorter than most days at the Model Garage. Gus Wilson generally goes bass fishing on Wednesdays, so on Tuesdays he likes to close shop fairly early so he can go home, get his gear ready, and pile into bed for an early start in the morning.

At about 6.30 on this particular Tuesday, Stan Hicks was finishing up his last job for the day, and Gus already had started to wash up. This, thought Stan, really would be an early evening.

That, as I say, was about 6:30. At 6:31 Stan wasn't quite so sure. For at that moment, a blue sedan with out-of-state license plates rolled through the open doors, came to a stop in front of the greasing rack,

When the hose popped loose, Gus reached for it and began probing one of the open ends with his fingers.

and a tall, heavy-set man unlimbered himself from behind the wheel

"The boss here?" The tone of the man's voice made it sound more like a command than a question.

Before Stan could answer, Gus appeared from the rear of the shop. "Something we can do for you?" he inquired. "We were just about to close up for the night."

"Yeah, I've got troubles," the stranger grumbled, jerking his thumb in the general direction of the car. "Just a few miles outside town, the engine started to get hot and sputter. Seemed to lose its power. Just when I'm in a hurry, too. Got no time to waste. Think you can fix it for me right away?"

"We can try," Gus answered, patting his hands with a wad of waste as he looked over both the car and the driver. "Might take time, though, to locate your trouble."

"But I said I was in a hurry!" the stranger snapped. Then, as if a sudden evening breeze had cooled him down a bit, he added, "Okay, but step on it. I'll get some chow. Is there a diner or lunchroom close by?"

After Gus had pointed the way to Dan's Gnile—that's one of Gus' favorite eating places—down on the Square, and the man had left, Stan said, "Unpleasant jerk. Why didn't you tell him to peddle his car, his troubles, and his ugly puss some place else 'cause you want to go fishin'?"

"A job's a job, Stan. Besides, those fish will wait for me; they always do. You finish up your job, while I'll see what I can do about tracking down the trouble here."

Gus slid into the driver's seat and started the engine. Stan could see him checking the gauges on the dash. Then he walked around to the front of the car and lifted the hood. The V-8 engine looked particularly clean. Next, he unscrewed the radiator cap.

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"Water seems to be circulating," Gus muttered to himself. "Might know it wouldn't be something simple to put your finger on." He touched one of the cylinder heads. It was considerably hotter than it should be.

Slowly and methodically, the veteran garageman proceeded to check the normal things that are apt to cause an engine to overheat and lose power—a slipping fan belt, wrong ignition timing or mixture, poor spark plugs, even low oil level. Everything seemed to be in fair shape. The timing was a little out, but not enough to cause much trouble.

When Stan finished with the car he'd been working on, he walked over to the blue sedan. Gus' head was deep inside the hood. He had a trouble light and was going over the engine carefully.

"What's the matter, boss, this car got

you stumped?"

Gus straightened up and slicked off the light. "There's more than one thing about this car that's got me stumped," he answered.

#### What Else is Wrong?

For a moment neither man spoke. They both just stood there thoughtfully looking down at the engine. Gus was leaning over, his right hand resting on the nearest of the two hoses that led from the tops of the cylinder heads to the top of the radiator.

Suddenly a big grin began to spread across his face. He squeezed the hose with his fingers.

"If it had been a snake it would have bitten me," Gus chuckled. "Stan, I think if you'll drain the radiator and take off that right-hand hose you'll find our trouble. While you're doing that," he added, after a look at his watch, "I've got to make a phone call. If you need me, just sing out,"

#### Service with a Smile

That guy is just too good natured, Stan thought as Gus disappeared into the garage office and closed the door. Probably phoning Ed up at the lake to tell him he'll be late tomorrow, and all on account of some out-of-towner who barges in here at the last moment and wants on-the-spot service.

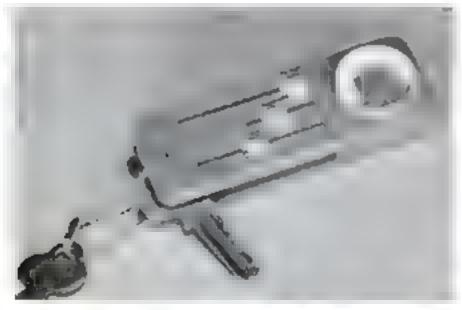
Stan took his time moving another car from the drain hole and setting to the job. By the time Gus came back, the last of the water was just dribbling out of the bottom of the radiator and Stan was attacking the hose clamps with a serew driver.

"I'll have it off in a jiffy," Stan reported. When the hose popped loose, Gus reached for it and began probing one of the open ends with his fingers. In no time, he had succeeded in pulling out what looked like a

cylinder of metal.

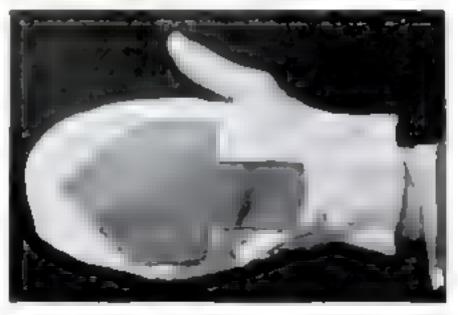
"Thermostat," Gus announced, holding it

#### **Key Holder Times Parking**



This novel plastic key container reminds you when your parking-meter time has expired. Simply adjust the sliding indicators along each of the three columns of figures to any predetermined time of the day. Top column represents hours; the middle one, units of 10 minutes; and the bottom one, minutes. The Park-Aid Key Kit, made by W. B. Youhon, of Wilkes-Barre, Pa., also has a handy small-change coin bank.

#### Hand Signals Visible at Night



A priver's hand signals are spotted quickly at night with this soft, flexible thumbless mitt that fits loosely over the hand, but is held securely by an elastic band. A bright red arrow on the back and white arrow on the palm are made of special light-reflecting material, like that used on many road signs. Available in three sizes, the mitts are priced at \$1 each by the Nite-Signal Mit Co., Hollywood, Calif.

up for Stan to see. "Or at least part of one. There are two thermostats in these V-8s, one mounted in each of the two water outlet fittings that extend up from the cylinder heads. From the looks of things, this one got badly rusted and came loose. Water pressure forced it up into the radiator hose where it jammed and shut off most of the water circulation to that bank of cylinders.

"See if we've got a replacement in stock, Stan," Gus added. "I'll remove the water outlet fitting and cut a new length of hose."

Working together, it didn't take them more than about twenty minutes to install a new thermostat and the new length of hose. When they had finished, Gus looked at his watch.

#### All This and Timing Too

"Our man won't have reached dessert yet," Gus said. "Might as well do the job right and adjust the timing while we're at it."

Stan was just about to make some comment about doing so much for a pecvish stranger they'd probably never see again when the office phone rang.

"I'll get it," Gus called as he hurried toward the office door, "Probably for me

anyway."

Stan was fussing with the timing when Gus came back out of the office. What he saw next was hard to believe. Gus picked up a cloth and began wiping the car down.

"Pretty dirty," Gus offered in way of explanation. "Might just as well give it a good dusting while we're waiting. Nothing like a little extra service for a friend."

"Friend?" Stan grunted. "Why that guy

wasn't even civil."

"Did seem that way," Gus answered with a grin, as he went right on with his cleaning job, even to spraying the windows and the windshield and wiping off the hub caps.

#### Best Is None Too Good

Stan couldn't figure out Gus's desire to give so much extra service to someone who obviously was just a one-time customer and a not-too-pleasant one at that. However, he'd worked for the gray-haired mechanic long enough to know that he usually had a good reason for just about everything he did.

Stan had just closed the car's hood and was rolling the engine analyzer back to the bench when the bulky stranger strode

through the open doors.

"My car ready?" he barked as he came in.



"Just finished with it," Gus replied. "We had to put in one new thermostat and adjust the timing. That'll be \$8.75 for labor and parts."

"What?" the man bellowed belligerently. "\$8.75? I-didn't expect to have to pay for

an engine overhaul."

"Take it or leave it," Gus shot back.

"I'd sure like to leave it if I could," the man continued to grumble. Then, reluctantly, he dug down into his pocket, pulled out a wad of bills, and peeled off a crisp, new ten. "I haven't the time to argue. Give me my change and I'll get out of here."

"Did you just buy this car secondhand?" Gus asked as he slowly counted out \$1.25.

"What business is that of yours?" the fellow snapped.

"None, but it's plenty of mine," put in a

new voice.

As the man spun around, he bumped smack into Sergeant Jerry Corcoran who had come quietly out of the office.

Quickly, the stranger made a dart for the door only to tangle with Gus's out-thrust foot and go sprawling on the floor. Jerry was on him almost before he hit.

"Nice work, Gus," Jerry said as he snapped a handcuff on the man's wrist. "Wouldn't be surprised if we find more than car snatching on this guy when we begin

checking up. In any case, he won't be around for awhile."

Stan just stood there bewildered as Jerry led the stranger out the back door to a white squad car where another trooper was waiting. Finally, he said, "Will you please tell me what the devil this is all about? If you knew the car was hot and the fellow

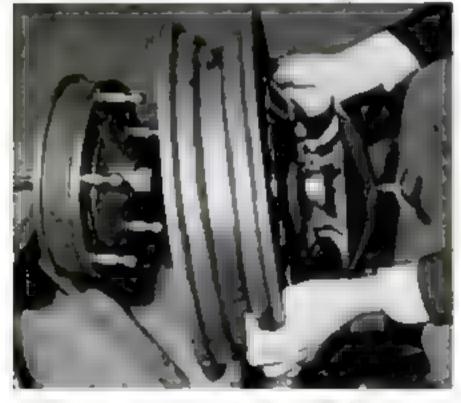
#### Robot Collects Parking Fees



THE hands at left are those of a driver making use of the Self-park system to park his car in an unattended parking lot. After placing a coin in the slot and pulling down on the knob, the driver takes the numbered ticket that comes out and at-

taches it to his steering wheel. One attendant can check many lots daily to make sure each car has that day's tag hung on it. Stanford Research Institute, Stanford, Calif., engineered the machine.

#### Change Wheel in 10 Seconds



CHANGING auto wheels will become a simpler and speedier job if a new fastening device lives up to the claims of its inventor, Lothar Stanetzki, of Bonn, Germany. Five threadless bolts on the brake drum enter holes in the wheel, as shown above, and are grasped securely by five plierlike levers that are locked by pushing in on the hub cap. The gripping action is said to increase with the motion of the wheel.

was a crook, why did we do all that work?"

Gus laughed. "I just didn't want Jim Fleming to have to pay for those repairs," he grinned.

"I still don't get it. Who is Jim Fleming?"

asked Stan.

"He's an old friend of mine, and the owner of this car," Gus explained. "When Jun lived here in town I used to see quite a lot of him. About a year ago, Jim and his family had to move over to Brighten and I hadn't seen either Jim or his car again until tonight.

#### Something Familiar Here

"It's funny, but the minute I started working on that engine," Gus continued, "I had a feeling I'd worked on it before. Then I happened to notice something—a welded brace on the generator support. I remembered I'd done a job just like that on Jim's car just before he'd left. So, I played a hunch. I made a note of the motor number and put in a long-distance call to Jim. I had no idea of his address, or whether he was still in Brighten, but the operator located him for me.

"He didn't know whether his car had been stolen or not. His wife had both the car and the license. He hadn't the slightest idea of what the motor number was; that was on the license. He said he'd try to locate his wife and call me back. When he did call back, everything checked, including the motor number. Seems his wife had parked the car in downtown Brighten and left the keys in the ignition. When she discovered the car was gone, she went right to the Brighten police without letting Jim know. They put a description of the car and the license number on the police teletype, but our pal had switched license plates.

"After I'd talked to Jim the second time, I called the State Police Barracks and tipped

off Jerry Corcoran."

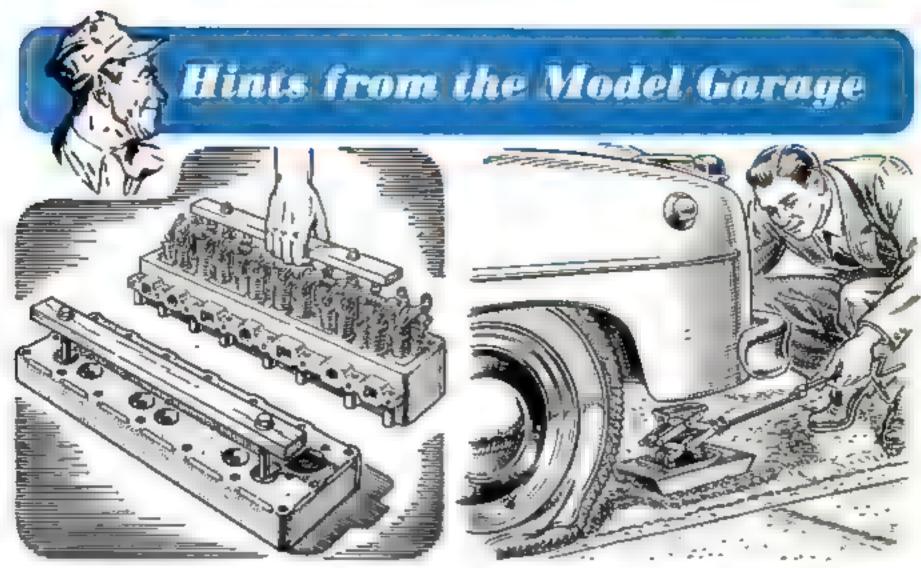
#### Waiting at the Plate

"But," put in Stan, "how did you know our friend wouldn't get back here ahead of time and mess up your little plan?"

"Elementary, Dr. Watson," Gus explained with a grin. "I just called Dan and told him to give our customer the slowest service

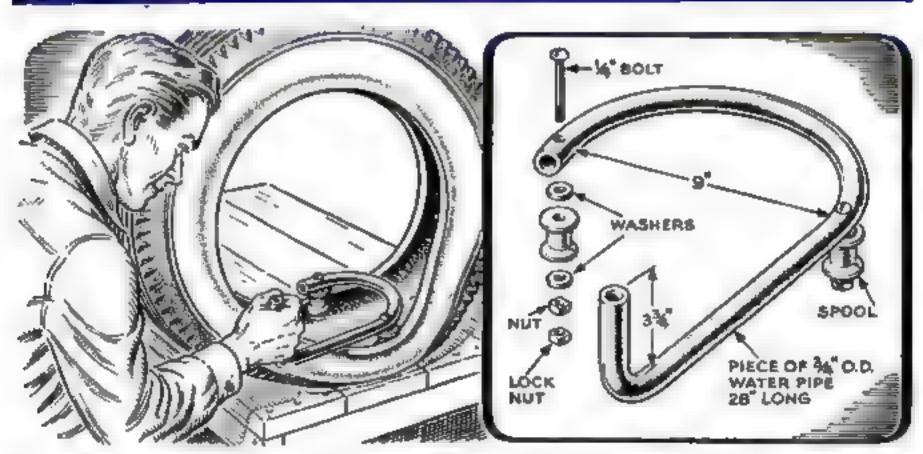
that Dan's Grille ever served up."

"Okay, Boss," Stan grinned. "Tomorrow we'll have a new sign made: 'Model Garage—Sherlock Wilson, Prop.—Auto Repairs and Crimes Solved'."



Lifting an Engine Head. A cylinder head is always a clumsy object to handle. A wood lifting bar makes the job easier. For an overhead-valve engine, drill holes in the bar to suit the stude that hold the rocker-arm cover. For a big L head, run bolts through properly spaced holes and thread into the end spark-plug holes.

Block Keeps Jack Stable. Most jacks tend to tip over while being cranked up to the axle or jack pad. To prevent this, Clinton B. Casler, of North Westport, Mass., drilled four holes in the base and attached a block of wood to it with screws. Such an enlarged base also gives the jack a firmer footing on soft ground.



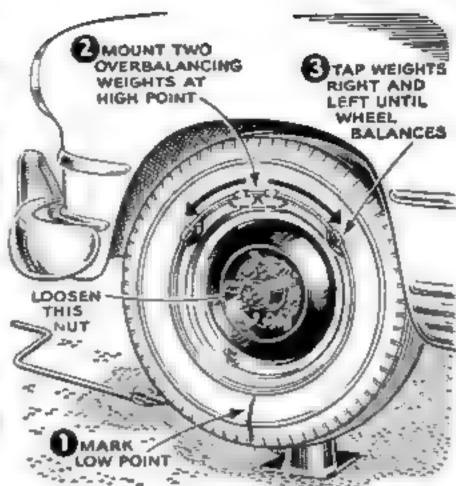
Tire Spreader from Serap. If you run a repair shop, the convenience of this tire spreader will soon pay for the trouble of making it. Cut a piece of water pipe to 28" length. Bend one end to a 9" are. The excess serves as a handle. Mount

two thread spools in the locations shown, leaving them free to revolve.

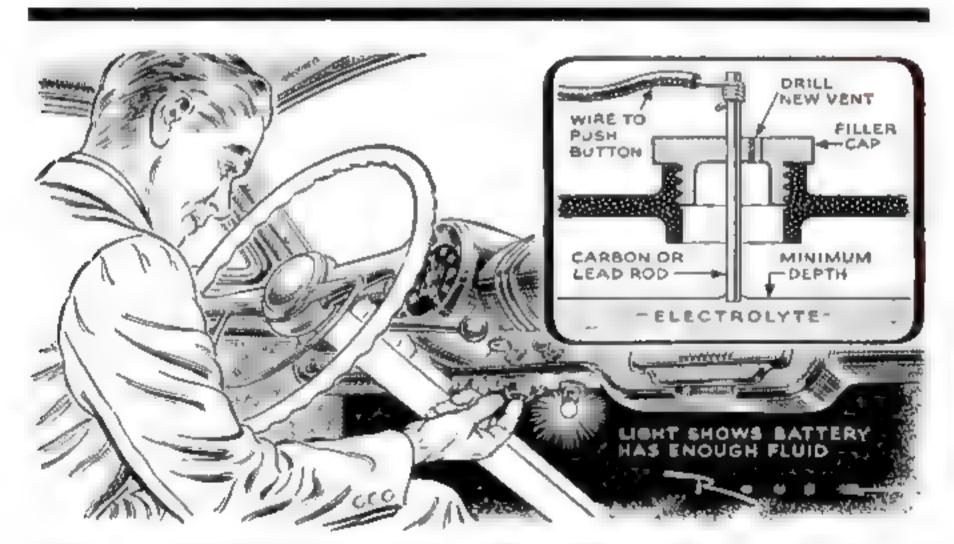
To use the tool, insert the spools into the casing, allowing them to rest against the bead on opposite sides. To spread the casing, move the handle inward.



Carrying Empty Bottles. If you consume a lot of cold drinks while traveling during the summer, you're apt to collect quite a few deposit bottles. To store these, keep a 6-bottle carry carton in the trunk compartment and they won't rattle around.



Halancing a Wheel. Paul L. Bratain, of Azusa, Calif., suggests you mount the wheel in front, loosen the bearing nut, and spin it to find the low (heavy) point. Then proceed as shown. At the high point, the weights must overbalance the low side.

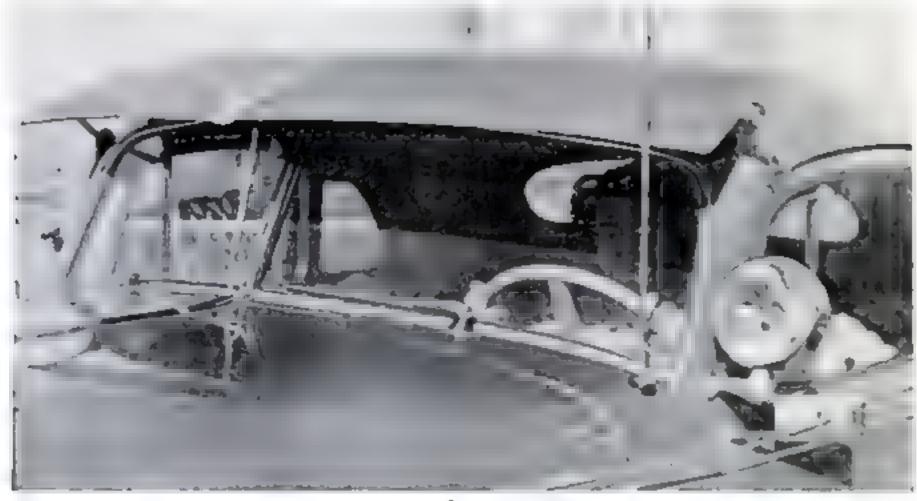


Light Checks Battery Level. To keep tabs on his battery electrolyte level during long, hot drives, Lawrence Avery, of Washington, D. C., installed a system like this. When you press the button, the bulb lights only if the flind is still up.

You can rig such a system by mounting and grounding a 4-volt bulb on the dash.

Connect the other bulb terminal through a push-button switch to a carbon or lead rod set in the filler cap nearest the ungrounded side of the battery. When the electrolyte level falls below the rod tip, the light circuit is broken

As a precaution, keep the electrolyte level a little higher in the other two cells.



When mounted, aluminum visor compares favorably with a commercial job-and costs less.

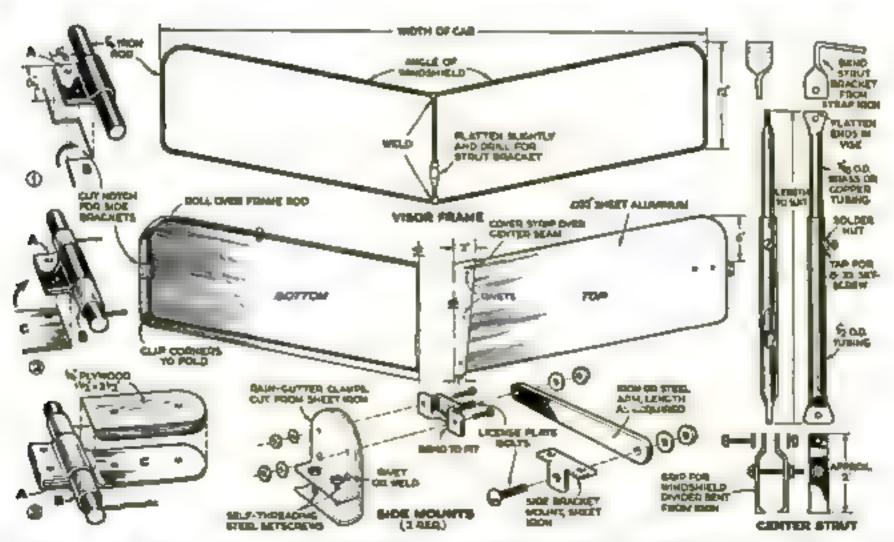
## Homemade Visor Costs Only \$4

By Roland Cueva

THE day I installed my aluminum visor, a friend wanted to bet it was too flimsy. I wish now I had taken the bet. Months later, the visor still is rigid. It has not shown the slightest sign of a wobble.

Even if you buy all materials, a visor like this usually can be built for less than \$4. Material at hand may reduce the total cost.

Frame. Measure the car width across the windshield posts and take the sweep-



Side-bracket details are seen from below in Figs. 1 to 3. Roll the notched aluminum (B)

around the rod. Bend stiffener strip (C) up and over bracket (A). Rivet through plywood,



Aluminum rolls eastly over the X" rod frame. Pound it down as shown here and then smooth the rolled inner edge with an iron bar like the one in foreground. Notice side bracket on the rod at the right.

back angle. Then cut a cardboard pattern 12" wide for half the visor, transfer it to plywood, and saw it out.

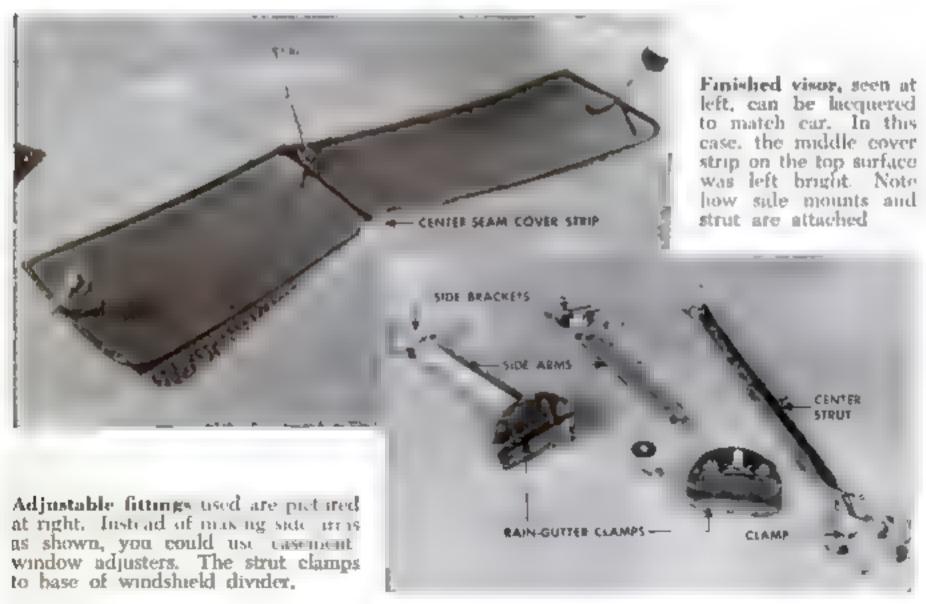
Nail the wood pattern to your workbench or shop floor. Starting at the center back, form the %" aluminum or iron rod around it. Clamp or nail the bent rod in place. When you reach the center front, pry up the pattern, flop it over, renail it, and continue bending the rod to the starting point. Cut off the excess rod and weld a piece 11%" long across the frame center. With a hammer, flatten a part of this member and drill two %" holes for the strut bracket.

Covering. Use .032" aluminum for this. A sheet 18" wide and 5% long will do the job. Put down the pattern and mark around it 1%" from the edge except at the center line, which you mark flush. Snip out this panel. Then turn the aluminum over. Use

the same center line to mark and cut the opposite panel.

Clamp the frame to the aluminum and roll the sheet over the rod. Clip the corners so they will pound down smoothly. When you install the side brackets, stiffen each, as shown, with an aluminum strip rolled over it and sandwiched between the cover sheet and a plywood block. Fasten by rivets through this sandwich. Make the center strut bracket and attach it with machine screws. An aluminum cover strip is riveted over the center seam and the ends rolled over the frame. Take the visor to the car. Bend it down gently over a sawhorse until it conforms to the roof curve.

Fittings. Details of these are illustrated but they must be made to fit your particular car. Shape the gutter clamps to match the gutter, and use nonrusting stock.



Performing these simple kome experiments will disclose the secrets inside of the meters and gauges in your car

## How Dashboard Instruments Work

By Kenneth M. Swezey

The speedometer—connected to the propeller shaft by a flexible cable—tells you your car's speed by a little lightning arithmetic. It counts drive-shaft revolutions and relates them to the size of the wheels. In one type, the indicating pointer is coupled to the rotating shaft through a centrifugal governor. In the usual type, however, coupling is achieved entirely by a trick of magnetism. You can show how this is done with the simple setup pictured below.

Suspend the top of an aluminum flour shaker at its center from a short length of rubber band attached to a horizontal wire. Stick a bit of

NOT many years ago an auto driver tested his gas supply with a stick—or found it was gone when his car stopped. He figured that his cooling system wasn't working when the radiator steamed; that oil circulation must be bad when bearings burned out or pistons froze in cylinders. If a policeman chased him, he was going too fast.

Today—thanks to ingenious electrical and mechanical devices—all these important variables of car operation are clearly registered on dashboard dials.

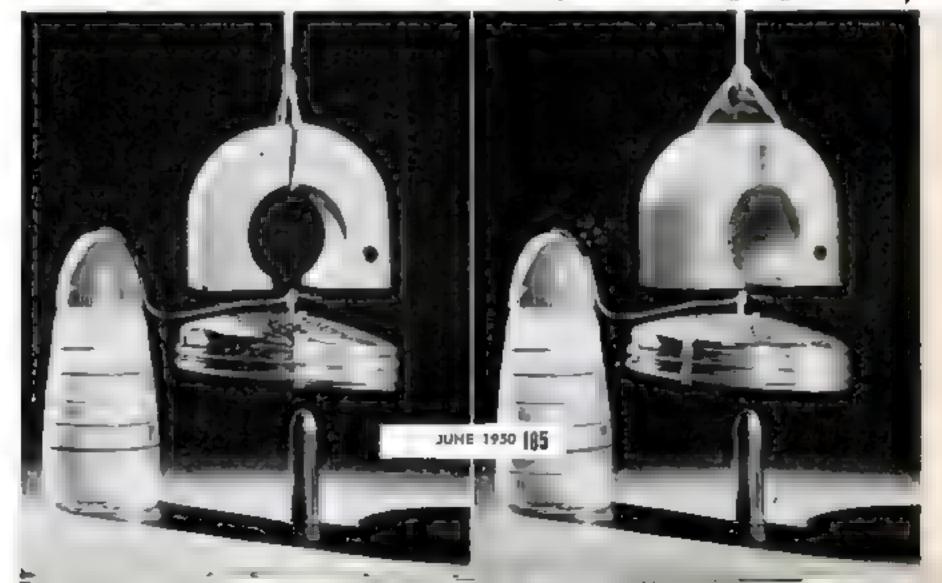
How telltale pointers can gauge the depth of gasoline in a tank, the pressure of oil, the temperature of water, or the speed of a car mystifies many car owners. But a closer look reveals basic scientific principles that

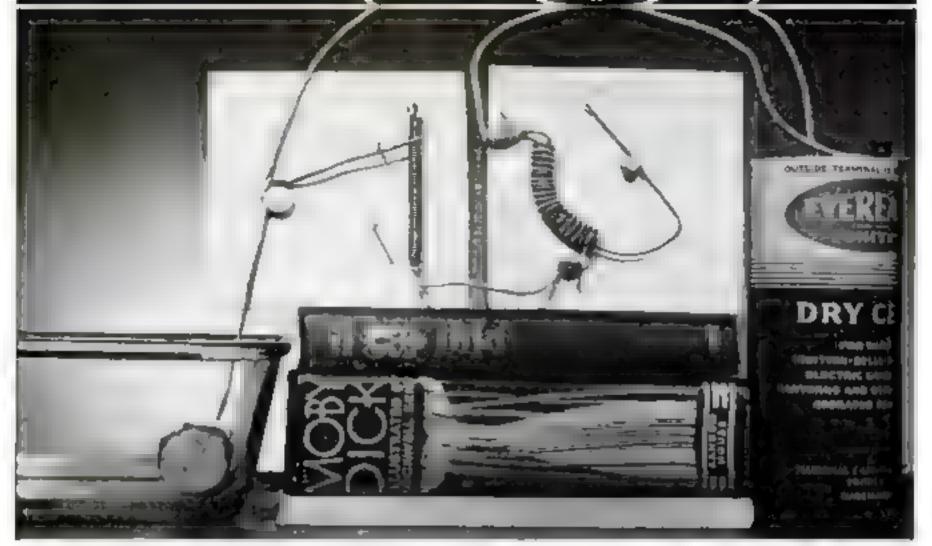
are easy to demonstrate and understand.

These stunts may help you do both.

gummed tape on one side as a marker and stand a pencil cap beneath the marker to note its position. Directly above the shaker top hang a strong horseshoe magnet on a rubber band.

Twist the magnet a dozen times and let go. As the magnet spins it induces currents in the aluminum, causes the cap to turn in the same direction. Speed of magnet rotation determines how far the shaker lid will swing. In a real speedometer a magnet connected to a flexible shaft rotates inside an aluminum cup to which the pointer is attached. A hauspring resists the torque of the rotating magnetic field.



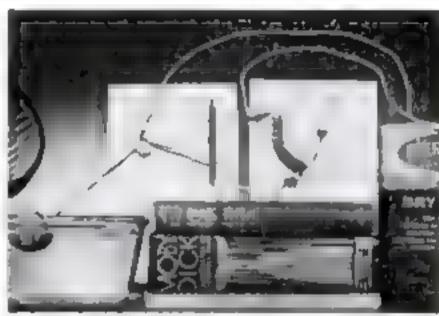


Gasoline gauges in most of today's cars work electrically. A tank unit—a rheostat controlled by a float—is in series with the battery and a current-reading meter on the dash. As the fuel level changes, the float rises or sinks, thus aftering the resistance of the circuit and the reading of the meter

You can make a simplified model of such a gauge as shown in the pluto above. For the moving part of the tank unit, bend a stiff wire and form a small loop at the bend to serve as a bearing. Pivot the wire by driving an upholstery nuil through the loop and into a board. Fasten a cork to the longer leg of the wire.

The resistance element is a light steel spring stretched slightly between two nails. The shorter leg of the bent wire slides along the spring. Two nails are used as stops for the slider.

The meter unit on the dashboard can be represented by the solenoid coil and pointer illustrated. Wind 20 turns of bell wire around a pencil and bend the coil in a quarter circle. Make the pointer and core from a single piece of from wire, again forming a small loop for a bearing. When assembled as shown, the core will be drawn into the solenoid a distance proportional



Connect the two units and a dry cell in series. When the tank is empty (top) the cork rests on the bottom and the meter hand points to E. When the tank is filled (above) the cork rises, lowering the resistance of the circuit. This allows more current to flow, which draws the core further into the meter coil and moves the pointer up toward F.



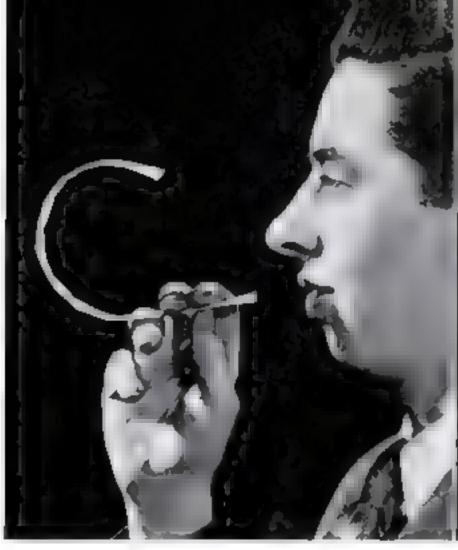
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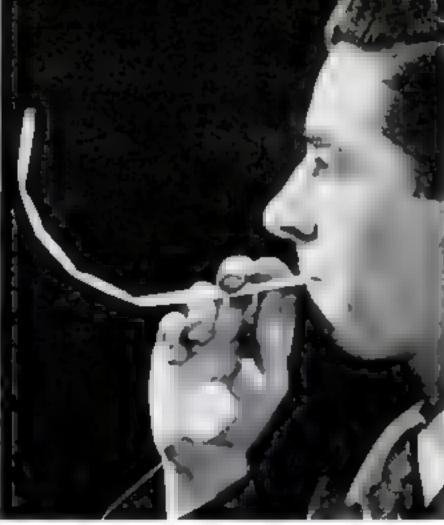
An earlier type of fuel gauge used hydrostatic pressure. In this system a vertical tube in the fuel tank is connected to one leg of a U-shaped tube containing colored liquid. The other leg forms part of the instrument panel. Gasoline rising in the tank tube compresses the air above it. Pressure transmitted to the dash unit raises the colored liquid in the open leg of the U.

To demonstrate the operation of this gauge, partly fill a glass U tube with ink-tinted water. (If you don't have a U tube, connect two straight ones with rubber tubing.) Join one leg with rubber tubing to a straight tube standing in an empty tumbler.

When the tumbler is empty the colored liquid stands at equal height in both legs of the U (left). But when you add water (right), the hand in the open leg rises.







A Bourdon tube forms the heart of both oilpressure and engine-temperature gauges in a lot of cars. Thus ingentous device consists of a thin metal tube of oval cross section, which is sealed at one end and bent to a nearly complete circle When a liquid or gas is forced into the open end, the tube tends to straighten. The same principle is used in the toy "tickler" that unrolls a long paper tube when you blow in one end

You can quickly make a working model of a Bourdon tube from a 1%" by 10" strip of paper, some cellulose tape, and a 10" length of springy wire. Fold the strip lengthwise and sandwich the wire in the fold (right). Scal the open edge and one end with the tape. Then bend the tube to the shape shown at the upper left. If you now blow in the open end, the tube will tend to straighten out in proportion to the pressure. This is because the flattened tube tries to become round, which straightens out the coil.

In a real oil gauge, a thin copper tube connects the open end of the Bourdon tube to the hibricating system. Oil entering the lower end of the connecting tube compresses the air above it. The closed end of the Bourdon tube is linked to the pointer of the oil gauge.

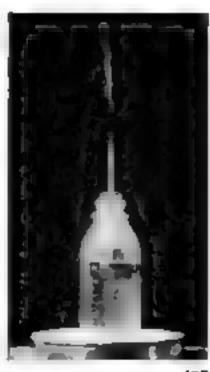


In the temperature gauge, pressure is supplied by the vapor of a low-bo ling haud such as ether. A bulb containing the liquid is screwed into the water jacket of the engine and connected to the dashboard gauge by a thin copper tube. As water in the jacket warms up, the vapor pressure of the other increases, causing the Bourdon tube to straighten and move a pointer over a calibrated scale.



The power of vapor pressure at low temperatures such as is used in the temperature gauge can be demonstrated vividly with the equipment shown at the left. Pass a jet-ended glass tube (a medicine dropper connected by rubber tubing to a straight tube will do) through a one-hole stopper large enough to cork a milk bottle. Just below the stopper, attach a small open vial containing a little ether or acetone. Now fill the bottle three-quarters full of warm water (much warmer for acetone than for ether) and press the stopper in firmly.

When the liquid in the vial warms up, its increased vapor pressure will force water up the tube, forming the spectacular fountain you see at the right. Caution: perform this experiment only in the open or in a well-ventilated room. Be sure there are no open flames nearby.



JUNE 1950 [R]

# New Gauge Flashes Warning If Tire Pressure Drops By R. P. Stevenson



DACK in 1939, a couple of mechanics were doing some dreaming. Wouldn't it be fine if a motorist could check his tire pressures from the driver's seat?

Friends pooh-poohed the idea. But Roy Addy, of Flint, Mich., and his son, Henry, of Milwaukee, Wis., set to work. The result was the new Air-Rite Tire Gauge.

Here's what it will do:

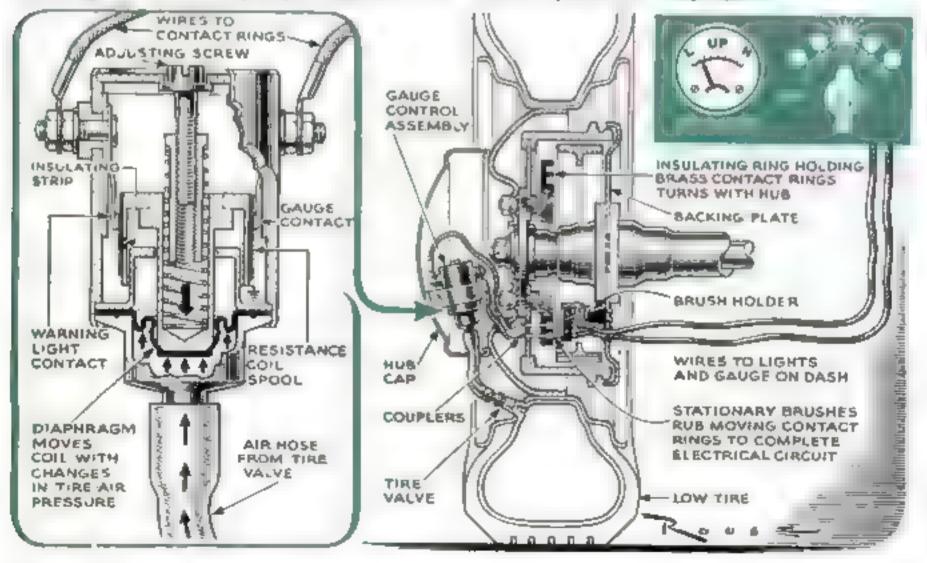
 If the pressure drops five pounds or so below normal, a dashboard light comes on. There are five lights-one for each tire, including the spare.

 If pressure builds up on a hot road to an unsafe maximum, the lights also flash a warning.

When a light comes on, you

How it works. A resistance coil on each wheel controls the system. When the pressure rises or falls, a spring-loaded diaphragin moves the coil

endwise. This varies the resistance and gives a relative reading on a dial. A second electrical circuit operates warning lights



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turn a selector switch, cutting into the electrical circuit that extends to the tire indicated by the light. A dual immediately shows whether the pressure is low or high, and about how much. If the pressure continues to fall, the needle will show it.

At any time, with the ignition key on, you can check the pressure in each of the five tires simply by turning the selector switch to the five dial points. You can do this even while the car is in motion.

The key to the system is a control assembly under the hub cap of each wheel. Inside the control, tire pressure pushes against a spring-loaded diaphragm. This is fastened to the end of a resistance coil so that as pressure rises or falls, the coil moves in or out. Two brass contacts ride against the coil.

These contacts are wired to two brass rings inside the brake drum. Bearing against the revolving rings are stationary brushes mounted on the brake backing plate.

Each brush is connected to one of the two electrical circuits that operate to each wheel. One circuit actuates the warning lights, the other the gauge. The control coil is grounded and the electrical return of each circuit is made via the wheel bearings.

As long as tire pressure is at the recommended figure, the sliding contact of the warning-light circuit rests on an insulated spot on the coil. The electrical circuit, therefore, is incomplete. If pressure rises or falls, however, the coil moves, and the brass contact slides past the insulated section. Now the circuit is complete—and the warning light comes on. An adjustment screw sets the coil for any desired tire pressure.

#### Works Like Gas Gauge

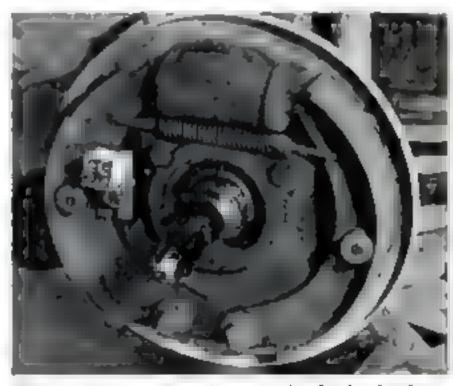
The pressure gauge works like your gasoline gauge. As the coil moves endwise across the fixed contact, the resistance varies in the gauge circuit. This varying resistance is translated, through electromagnetic action in the dash unit, into a needle reading that shows tire pressure.

The George J. Mayer Co., of West Allis, Wis., is now making two versions of the Air-Rite gauge. The de luxe type shown is about \$85 installed. A simpler type, with only the warning light feature, is expected to sell for about \$45 fitted to the car.

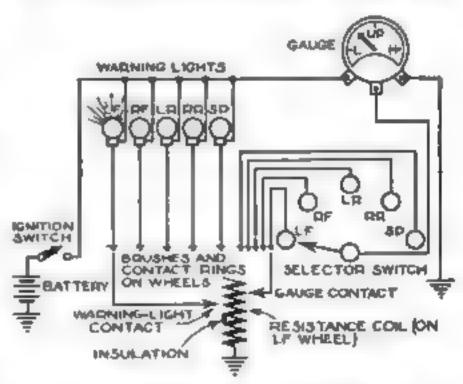
In the lower-priced gauge, an aluminum tube replaces the resistance coil in the wheel control. Lake the coil, this tube has an insulated spot on which the contact rests as long as the tire pressure is normal. END



Control unit fits under hub cap, Hose connects it to tire valve. Wires run to two contact rings on the inner flat face of brake drum. Bayonet couplers disconnect wires for changing tires.



Two stationary brushes on the brake backing plate are seen at left above. Each rubs against one of revolving contact rings on drum. After unit is installed, the wheel must be rebalanced.



Warning-light contact rests on insulated spot if pressure is normal. When pressure changes, coil moves. This completes circuit, turning on the light. Sketch shows only one wheel coil.

# Roll Your Power Tools To Outdoor Jobs -- Perio Series

PS photos by W. W. Morris

WANT to build a garage, sammer house, or maybe a dock at your summer entage? Then take your power tools right along with you. Mount then on where I stands and you can use them as you ere within extension cord reach of an electrical mitlet.

Both the jointerent and the sawcart pictured here are so designed that all four legs clear the ground as soon as you mase the handles. They roll senently on the 10" semi-picanactic whichs. Once you've pashed



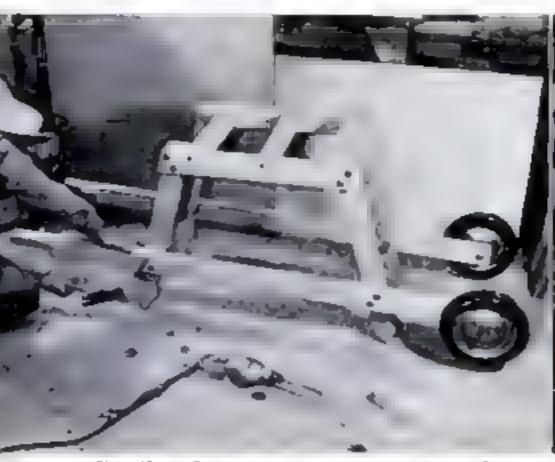
them to the job, the pointed legs set firmly in the ground to hold the tools steady as you work. And both the earts are heavy enough to be stable on a concrete floor or walk

When you have finished a job outdoors, you can roll the carts back into your shop. Indoors you'll find your tools are more versatile on these carts than when mounted on permanent bases. That's especially true if the room that houses your shop is small With the tools on wheels, you can move them around to handle longer work.

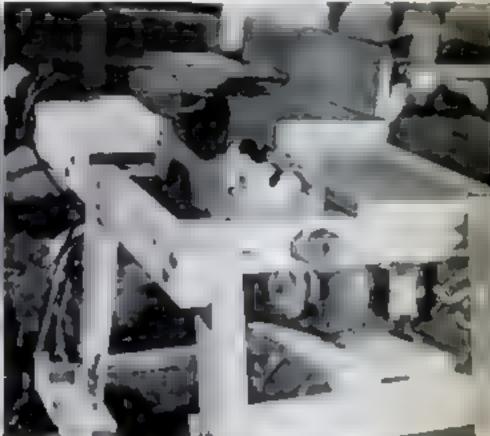
The dimensions of the frames depend on

your tools. The height you want the saw and jointer from the ground depends on your own preference. All the main frame members are 2" by 3", including the crosspieces to which the saw and jointer are bolted. The smaller crosspieces are \( \frac{\pi}{2}'' \) stock. Four-inch \( \frac{\pi}{2}'' \) 16 carriage bolts hold the frames together. The legs sit at 15° to the frame and the points are cut at 35°. Before the 15° cuts were made, the sawcart's legs measured 25" and the jointercart's 29".

Positioning the wheels is important if the legs are to clear the ground properly when



Details of nawcart construction are shown above. Crosspicees are held by wood screws 35" long. Distance from grip to keg is 18".



Motor of jointereart is bolted to \$" plywood base that's hanged to crosspiece. Motor is offset for balance. Hook is for extension cord.

Circular saw is centered on and bolted to pair

of 2" by 3" crosspicees. When eart is moved, i

nater gauge hangs on mail in right front leg

View from front of jointercart shows necessories. Drill chuck fits in metal loop and handle fits over hook so drill can't fall off

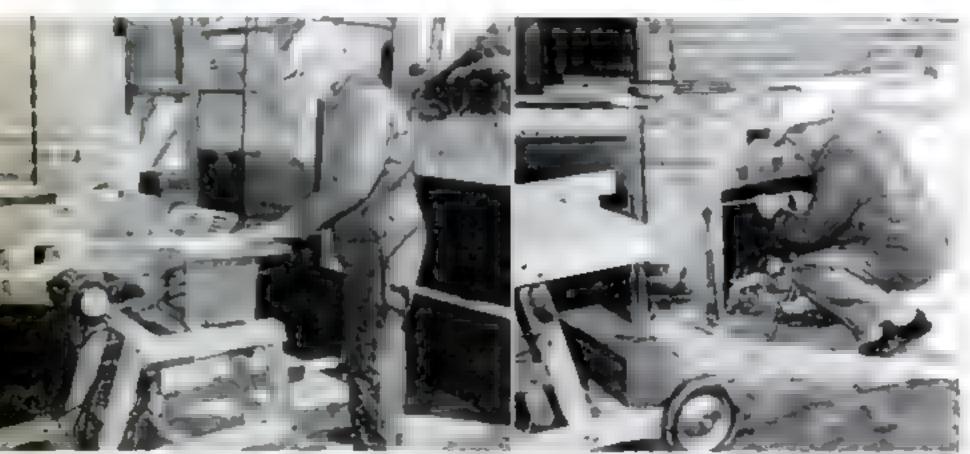


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Jointer in use. Because infeed table extends beyond cart frame, handles are 26" from grip end to leg-8" longer than on sawcart.

Vise on corner of jointercurt worktable is handy accessory. Since jointer isn't flush with side of frame, vise can handle long work.

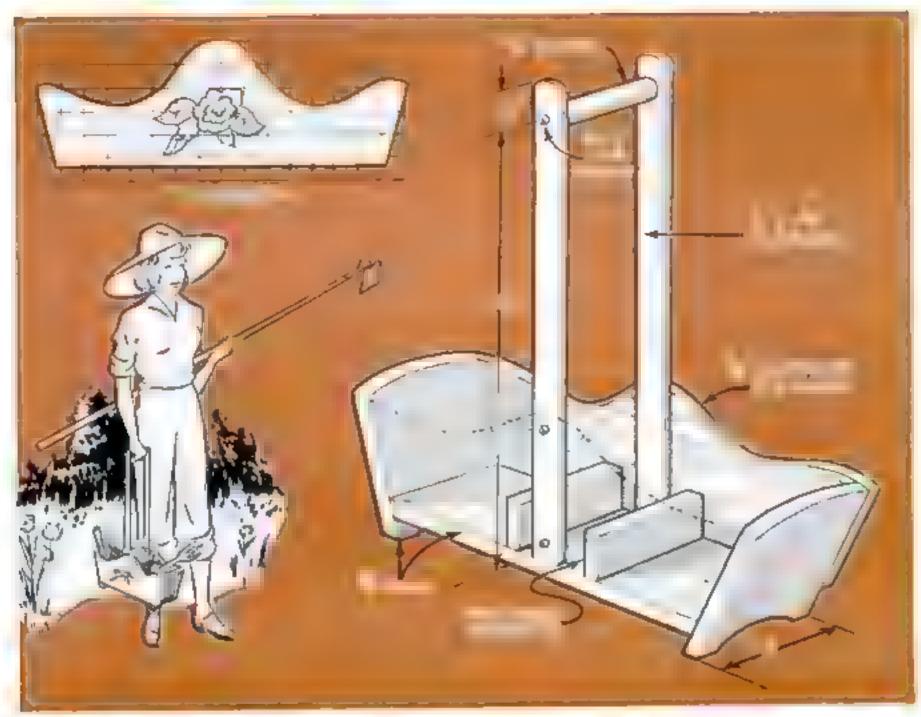


Saw in use. Even on hard surface like concrete walk, both units are heavy enough, and have legs spaced sufficiently, to be completely stable

Triple outlet on leg of jointercart saves trouble of disconnecting and connecting main extension cord when drill is used.

the carts are moved. Holes for the axles—¾" by 5" carriage holts—are centered 1¾" from the ends of the handles. The wheels are attached with nuts, washers, and lock washers. From the wheel end of the handle to the front of the front leg is 13" measured along the top of the handle. Measured from the points along the center of the legs, the distance from the ground to the bottom of the handle is 5¾" on the front leg and 7¾" on the rear leg.

Besides the handy worktable of %" plywood, the jointercart is fitted with a vise, electric drill, rack for bits, and a toolbox. To avoid running more than one extension line to the job and still have all the tools plugged in for instant use, a triple outlet is screwed to one side of the jointercart. With this outlet plugged into the extension cord, the saw and other tools can be hooked into the triple outlet. The motor of the jointer is offset to balance the cart and to allow a free space below the jointer for the chips to drop through. To avoid poor motor performance from voltage drop, use the huskiest extension cord you can get.



#### No-Stoop Kit Carries Garden Tools

Canay small garden tools in a kit like this and you won't have to stoop over so often to pick up implements when you move from one spot to another. Besides space for several tools, the kit also has a compartment for

packets of garden seeds. The drawing gives you all the construction details. Put the parts together with wood screws and glue, paint the kit lemon yellow, and add decals for decorations.—Hi Sibley, Nuevo, Calif.

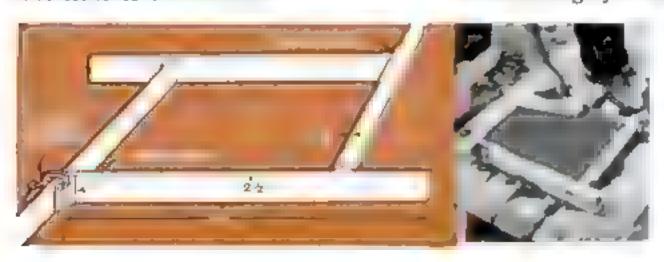
#### Make Cement Stepping Stones in Your Back Yard

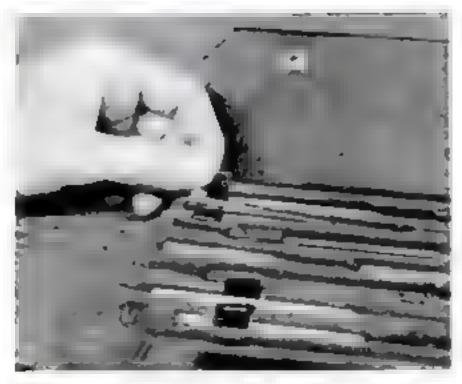
HERE's an adjustable form you can use to make stepping stones up to 22" square. You can make plain blocks or you can make them in different colors. The drawing below shows you how to build the frame. A C clamp at each corner lets you adjust the four sides to desired size.

Mix three parts of sand to one part cement. Add just enough water so the mixture will hold together when squeezed in your hand. In another box, mix a smaller batch in the same proportions. Into the second batch add dry mineral color. Mix the sand, cement, and color until it is the desired shade. Then add water.

Fill the frame to about %" from the top with the gray cement. Finish filling it with

Smooth it off with a wood float. If the cement is tamped hard and the mixture fairly stiff, the frame can be removed soon after the block is made. — Dick Hutchinson, El Monte, Calif.

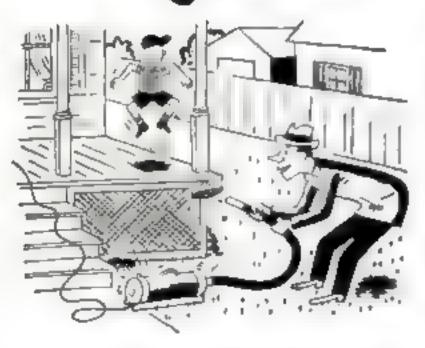




#### Tabs Improve Brafting Kit

SMALL cloth tabs stapled or glued in your drafting kit will speed removal of stubborn instruments. Fasten one end of the tab at the edge of the groove that holds the instrument. Lay the instrument over the tab so the free end of the tab sticks up on the other side. To remove the instrument, pull on the free end.—Don Pittwood, Moscow, Idaho.

#### The Height of Ingenuity

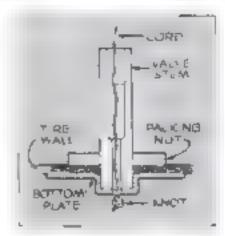


I got tired of yellow jackets zooming out of their nest under the porch and power diving on me. Here's the way I got rid of the whole gang.

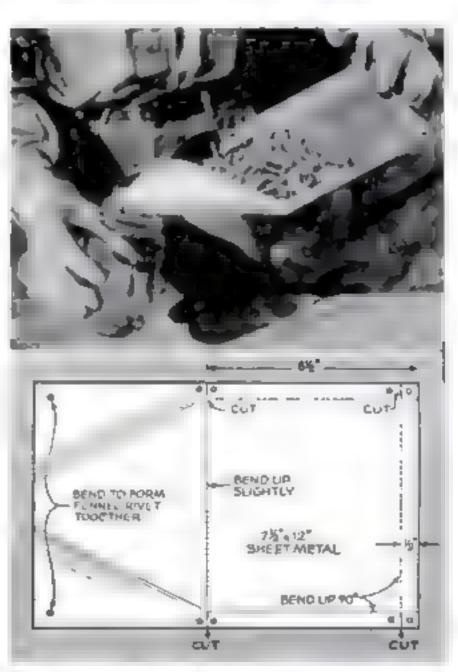
While someone else jumped up and down on the porch to stir up the wasps, I stuck the nozzle of my tank-type vacuum cleaner near the nest. I neatly collected the whole swarm and then let the vacuum suck up some DDT powder.—Jack Frederick, Bloomsbury, N. J.

#### Installing Tubeless-Tire Valve

A DEFECTIVE valve in a bicycle or other tubeless tire is easily replaced by the method shown. Before forcing the bottom plate through the hole in the tire wall, put in a knotted cord as indicated. You can then



hold the bottom plate in position against the inner side of the tire while you screw in the valve stem and tighten down the packing nut. Then cut the cord short and let it drop inside the tire. It won't do any harm.—
H. J. Bradshaw, Bradenton, Fla.



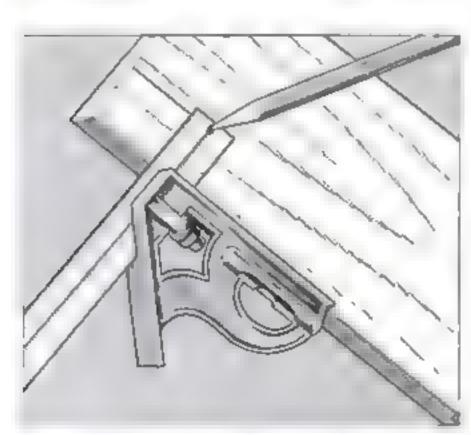
#### Funnel Is Sorting Tray

ONE piece of light sheet metal, galvanized iron or aluminum, is all you need to make this handy sorting tray and funnel. Snip the sheet to 7%" by 12" size. Mark the cuts and sharp bends with a scratch awl. After bending as indicated, fasten with small tinner's rivets. Rivet to the flat end a %" by 2%" tab of sheet metal, drilling a large hole in the outer end so the funnel tray can be hung on the wall. Smooth all edges with a file.—Claude Sessions, Waynesville, Ill.



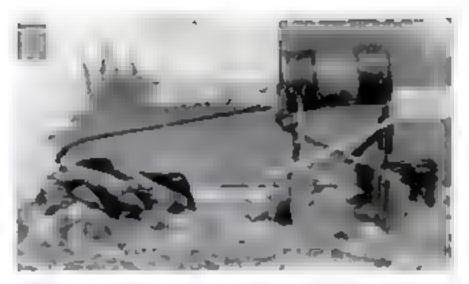
#### Siphon Hose Fills or Drains

WITH this device attached to a faucet, you can fill or drain heavy tubs or cans without lifting them. All you do is turn on the water and then twist the valve to the right to fill or to the left to empty. Water running from the faucet sets up siphoning pressure to empty containers. The device can be used to drain flooded cellars or small pools. It's priced at about \$4 by the Metalace Corp., New York City.



#### Square Doubles as Scribe

Your combination square can be used as an accurate scribing tool. Near one or both ends of the steel rule, drill a small hole to take the point of an awl, pencil, or nail. To use the scribe, press the straight side of the combination head against the edge of the work, set and lock the steel rule, and move the head along the edge. The point inserted in the hole will draw a line parallel to the edge as the head of the square is slid along.—N. C. Darling, Danbury, Conn.



#### Stump Burner from Oil Drung

You can build an efficient stump burner with an old oil drum, pipe, and a valve. Build the stand so the drum tilts toward its opening. Curve the pipe as pictured. Adjust the valve so the oil—old crankcase drainings will do fine—drips slowly onto the stump. Once the fire is started right, it will burn for hours without attention.—E. V. Reyner, Townsend, Mont.

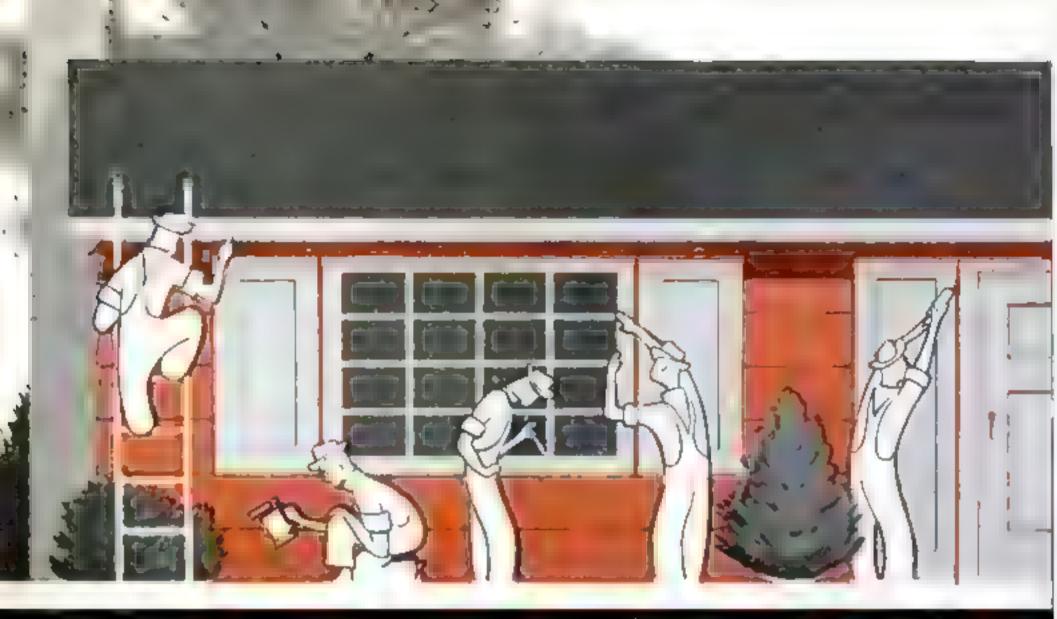
#### Give Your Star Drill a Rest

It's no longer necessary to drill holes in the bathroom wall to mount a towel rack or other fixture. Flat-based unchors now on the market can be stuck securely to tile, masonry, and other surfaces with a special adhesive.

Goodloe E Moore Co., of Danville, Ill., makes its Gemco Anchor Bolts especially for home use. Devices, Inc., of New York, supplies Miracle Surface Anchors with bolts, nails, hooks, and other fastenings.



They're mosons. The owner of a house under construction thought they were doing a bad job of laying bricks. The contractor explained that they were scintling—laying bricks irregularly so the wall had a very rough texture for architectural contrast.



SCRAFE OFF LOCAL, BARTESON, GO., SLAKENSK SAMEL, et TO SEMBLE BARLE CHECKED AREAS. ORIGINAL WESTERS FOR LOUSE PLATE, MALACE M MINOR. SHIP STATES.

STRACT CAMMING STREET PROP AND WINDOW FRANCE.

# How to Paint a House

Now's the time to dress up your home with a coat of fresh point. Pick a dry, clear day and use good brushes and good point.

#### By Bernard Gladstone

BESIDES keeping up the looks of your home, a new paint job at regular intervals is low-cost maintenance. Paint forms a durable, weatherproof film that protects wood and metal from rot and rust. And there's nothing complicated about doing your own painting. By following a few simple rules, you can turn out a really first-rate job.

If possible, do the painting during periods

of mild temperature and humidity. Never paint in damp weather or right after a rain. Be sure the surface to be painted is dry and clean. Otherwise, you'll find the new paint blistering and peeling in a very short time.

Preliminaries. Before you dip a brush in a pot of paint, take care of the preparation—removing old paint that is blistered, reputtying, recalking, and removing shutters and screens. These steps are important. Painting over old paint that is blistered or peeling is a waste of time and money because the new paint will soon peel off.

Start by scraping off any loose, flaking, or peeling paint. Use a hand scraper or a stiff putty knife. Be particularly careful to remove all scaling paint and accumulated paint from window sills and other trim. Any area that it rough must be smoothed down

with sandpaper or steel wool.

In some places, you may find the old film so thick and full of check marks that it is almost impossible to smooth it. In such cases, the usual method is to remove the old paint by burning it off with a blowtorch. Keep a pail of water or a fire extinguisher handy, and try to avoid charring the wood. Direct the flame horizontally and use a long-handled putty knife to keep your fingers away from the flame. Heat the old paint until it softens and blisters. Then



scrape it off right down to the raw wood.

Puttying and calking. Examine all such for putty that has loosened or fallen out. Scrape the rabbet clean, brush on a coat of primer, and—when dry—replace the putty. Examine siding and trim for nail holes and cracks. Brush these clean and give them a coat of primer. After the primer has dried, fill in the cracks and holes with white-lead putty.

Check around all the door and window frames for calking that is loose, cracked, or missing. Replace calking where necessary. For a good job, use a calking gun. It'll squeeze the calking material out with a smooth, even pressure—forcing it well into

the joints.

Where you've scraped the old paint down to the wood, seal all knots and resinous spots with a coat of shellac followed by a coat of primer. Let the primer dry at least 36 hours before painting over it.

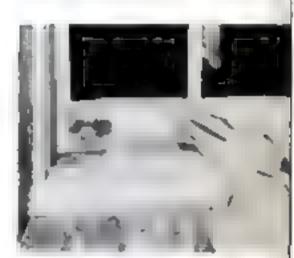
After you've smoothed and scraped the surface to be painted, use an old paint brush to whisk off all dust. The surfaces must be clean or you won't get a lasting job with the new paint.

Painting. When repainting over old work, the question of whether to put on one or two coats often comes up. Generally speaking, two coats are advisable. But if

Basic preparation step is removing old paint that is blistered, flaking, or peeling. Hook scraper is the tool for this job. Correct use of scraper is shown at right

In close quarters, especially on sash, a stiff putty knife is sometimes better than a scraper. Flaking paint is being removed from sash in this photo.

Go over all sash carefully for cracked, loose, or missing putty. When you find putty that's in bad condition, remove it by scraping it away with a putty knife.





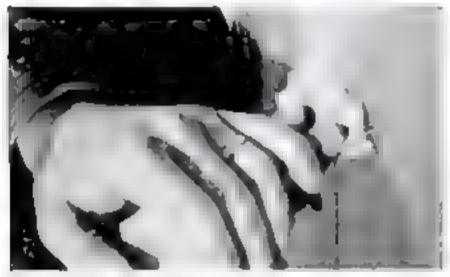




If old paint is thick and rough, use blowtorch to burn it off. Heat softens and blisters old paint so you can scrape it off.



Before reputtying, brush dust out of rabbet and give it a coat of primer or raw linseed oil. Apply putty smoothly and scrape off excess.



Clean out all cracks, give them a coat of primer, and till them with white-lead putty. Nail holes also should be filled with putty.



Use a calking gun and a gun-grade calking compound to seal all cracks around door and window frames. Do this before painting.

the surface is in pretty fair condition and has not been neglected too long, one coat will often do. At any rate, don't lay on one very heavy coat and expect it to do the work of two. This may cause the finish to wrinkle on drying. The surface of a thick coat dries before the paint underneath does, resulting in uneven shrinking. If two coats are used, let the first one dry four or five days.

Start the new paint job with the siding. Begin at the highest point and work across. Don't start at a high point and paint a strip down to the foundation. Work across, climbing down to move your ladder over for the next area. By working across, you'll avoid lap marks. Never move your ladder with the pot of paint hanging on it, unless you're after low-comedy effects. Instead, bring the paint down with you.

Always be careful that the ladder feet are anchored firmly in the ground. You can check this by jumping on the bottom rung before climbing up. When you have to rest the ladder on a concrete walk or driveway, nail a rubber heel to the bottom of each leg to prevent slipping. If you use a metal ladder, make sure it's fitted with rubber-

covered safety shoes.

Finish painting all siding and double back to do the trim and sash. One exception to this would be a high peak where you have to paint both trim and siding. Two trips would mean a lot of extra climbing. In such a case, it's better to carry up two pots of paint—one for the siding and the other for the trim and do the job in one trip up the ladder.

If the siding of your home is clapboard, coat all the edges in any one stretch. Then paint the flat side or face, working horizontally across two or three boards at once. A 3%" or 4" brush will generally be found best for this work.

Painting trim. If your trim is to be painted a dark or bright color, it's wise to use one of the special trim paints rather than regular house paint. These trim colors are made to give a hard, glossy, nonfading surface. Ordinary house paints are designed to break down by a continuous, mild, chalking action. When washed down by rains, this action tends to leave a clean surface. Such paints are suitable for large wall areas. They're designed to eliminate the possibility of accumulating too heavy a layer of paint that'll eventually crack, or alligator, and have to be smoothed over for the next job. However, this chalking action can be ob-



When working on an extension ladder, use a pot hook to hang your can of paint. Safest type hangs can outside of ladder as shown in photo at left.

Use sash brush on sash and trim. Press down to fan the bristles out to a sharp edge as shown at right. Control brush with your forearm; not just your wrist.





Paint doors like this. Do all panels. Then coat rails, stiles, and mulhons. Rails run across, stiles and mulhons, vertically.



To prevent copper gutters and other fittings from oxidizing and staining trim as shown here, coat them with spar varnish.

jectionable on surfaces that must be handled —such as doors and windows. Then, too, chalking usually results in a gradual fading of colors. Using trim paint on windows, doors, and trim gives you better protection.

Painting such. Use a 1%" or 2" sash brush. These brushes are especially made to be used edgewise. Dip half the length of the bristles into the paint. Touch the brush to the sash a little way from the edge of the glass. Twist your hand slightly to fan the bristles out to a sharp edge. Then, keeping the bristles under tension, use your whole forearm to draw the brush smoothly and steadily along the sash.

When painting paneled doors, avoid runs by always painting in the panels first. Do the rails next and the stiles and multions last.

Painting metal. Copper gutters, copper screens, and other unpainted metals that oxidize often stain the trim of a house after a few rains. You can prevent further oxidation and staining by brushing the metal clean and then coating it with spar vamish.

Metal surfaces—such as railings and grates—usually are painted along with the trim.

Use a wire brush to clean all rusted or peeling areas. Then spot-prime them with red lead or zinc chromate. In the case of new metalwork, brush on a coat of metal primer or zinc chromate and follow with one or two coats of trim paint.

Galvanized metals should first be washed down with a metal wash to etch the surface so the first coat of paint will stick. If possible, buy a ready-mixed wash. Otherwise, use a half-and-half solution of vinegar and water, rinse with plenty of water, and let the metal dry before painting.

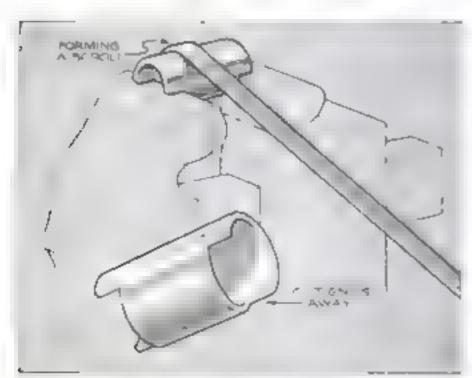
When the job is done. Before you put the brushes away, wash them in three or four rinses of turpentine until thoroughly clean. Then comb the bristles straight and wrap the brushes carefully in heavy paper to preserve their shape.

Leftover paint should be poured back into the can from which it came. Then pour a little turpentine into the can, running it down the side so it floats on top the paint. Seal the can tightly. The turpentine floating on the top of the paint will keep it from skinning over for some time.



#### **Cupboard Door Resists Warp**

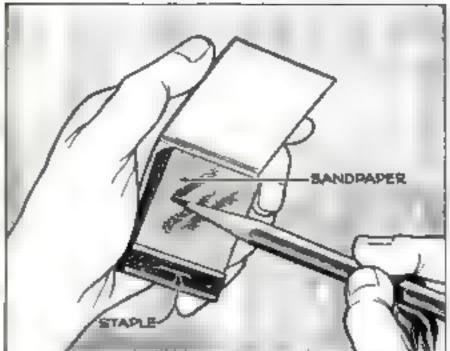
HARDWOOD plywood facings, bonded to a frame of low-density wood, make this door warp-resistant. The low-density wood is relatively inert and less subject to warp and twist. Ventilation keeps the interior of the door dry. The doors are made by the Wisconsin Laminating Co., of Chilton, Wis.



#### Stakes Made from Pipe

With a few pieces of pipe and a hacksaw, you can make your own metal-working stakes. For each size cut off half of each end of a 4" or 5" length of sturdy pipe. When you insert the shouldered ends in the jaws of your vise you have an inexpensive stake for shaping decorative strap iron.—

1. D. McCorkindale, Ames, Iowa.



#### Matchbook Pencil Pointer

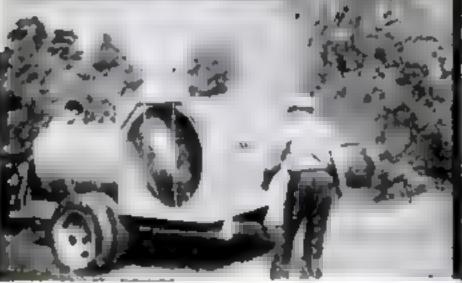
A CONVENIENT accessory for your drawing board or sketching pad is this little book of sandpaper. Cut six to 10 pieces of fine sandpaper to fit an empty matchbook. Run a narrow line of glue along one end of the pieces and stack them up to dry. Remove the staple, insert the glued edge and restaple.—H. E. Carter, Noblesville, Ind.



#### New Paints Stick to China

Liquid-Plastic glazes let you paint designs on china, glass, and metal, which then can be baked on in the kitchen oven. About an hour's baking at a temperature of 250° makes the designs permanent. Della Robbia, one of the new paints, is made by Sculpture House, of New York City. Dek-All, another such paint, is made by the American Crayon Co.





#### Airplane-Engine Blower Sprays Orchard Fast

When Howard L. Jenkins sprays his orchards near Chester, N. H., with this homemade outfit, he must keep three engines going. One runs the tractor, a 5-hp., aircooled job does the pumping, and a rebuilt 40-hp. Continental airplane engine, driving a sawed-off, four-blade propeller, blows spray into the trees.

A 300-gal, spray tank is mounted on a dual-tired truck rear end as above. Behind it is a sheet-metal wind tunnel containing the plane engine and prop in one end, and eight

tiers of atomizing acceles in the other. Photo at right above shows how the pump feeds spray to the nozzles through four lengths of %" hose. Metal vanes between the nozzles regulate the elevation of the spray. Riding the tractor, one man can operate the sprayer, which Jenkins claims does a job twice as fast as the usual commercial sprayer.

#### Workbench Drawer Slides on Angle-Iron Strips

ANGLE iron provides a husky method of mounting a drawer under a workbench. The



photo shows how to do it. Attached to each side of the drawer, the "" by 1" by 1" angle iron slides in a 3/16" by 1" rabbet cut in two-by-four supports bolted under the bench. The drawer is ideal for heavy tools.

—J. C. Magee, Schenectady, N. Y.

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Right- or left-hand? The gag about the left-hand wrench has whiskers, but the boss who asks for left-hand aircraft snips isn't kidding. Here is a left-hand pair, but you could use them in either hand. Do you know why?



Cutting an inside circle. After scribing the circle on the material, place the sheet on a wood block and make two crossing cuts with a cold chisel. Turn over the sheet, pry up the cut

material, and snip it out. Then turn the sheet right side up and cut from the hole to the guide line in a spiral path, above right. Follow the scribed line with very short cuts.

PROPERLY used and cared for, a good pair of snips should last for years in the home shop. Here are some pointers:

Always cut with the handles at right angles to the metal. Slanting makes cutting difficult and may spring the blades.

In beginning a cut, line up the upper blade with the scribed line and hold the grips a little above the plane of the work. To avoid scratching a polished surface, you can tape the blade "shoulder" that may touch the work.

Grip one handle in vise if you're using big snips to cut heavy stock. This gives better control and makes snips easier to handle



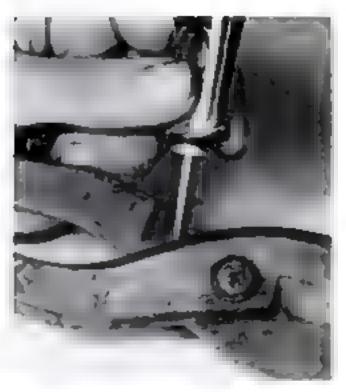
Make it a rule to close the blades part way before making a cut. A Douglas Aircraft instruction booklet notes one possible exception, however. With duckbill snips, it's permissible to cut at the base of the blades to get full leverage on heavy stock.

While cutting, use even pressure and take short strokes, especially on curves. When very strong leverage is required, rest the snips on the bench and bear down on the upper handle. An alternative is the vise setup shown at left below. Never force the cut by hammering the handles.

Snips come in four major types: the regular pattern, for straight cutting only; the combination pattern, for straight and curved cuts; curved-blade snips, for cutting curves only; and aviation snips, for cutting curves, straight lines, and intricate designs.

Regular and combination snips are often similar in appearance, but the blades of the latter are ground in such a way that curves

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Oil and adjust snips at regular intervals. Use a machine-bearing hibricant. If blades are too tight, snips cut hard, if too loose, they chew metal. To adjust, pull the nut tight, then back it off slightly. Carefully used, snips will cut well for a long time without sharpening. If you try to sharpen them, be sure to keep original bevel angle on the blades.





Cutting a disk. After scribing the circle, cut the corners from the material so the strip of waste will be narrow enough to roll out of the way. Then slant in to the guide line, as seen

in the center photo. If the waste strip gets in the way, snip it off, as at right, leaving a stub to guide the blades to their previous path as you begin cutting scribed line again.

can be cut. In curved-blade snips, the blades are curved to the side. To use them, you turn the blades so that they curve in the direction of the curved line that you have scribed.

Aircraft snips, pictured at the top of the facing page, give tremendous cutting power because of their compound leverage. Sertated jaws prevent shipping. A strong spring forces the jaws apart, a hook or loop being provided to keep them closed.

With some compound-lever snips, you can cut both right- and left-hand curves, depending on which way you turn them in your hand. Others, however, are designed for one-direction cuts and are called right-or left-hand snips. Right-hand snips cut curves to the right, that is, clockwise; left-hand snips in the other direction.

You can use each type in either hand. You are holding them properly when the blades curve up slightly, like a spoon. END CUTTING EDGES OF SNIPS.

CUT TO ENDS OF BLADES

OR YOU MAY CRACK METAL

AT STOCK APART YOU MAY SPRING THE BLADES

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#### Hand Tools Make Chinese Shelf

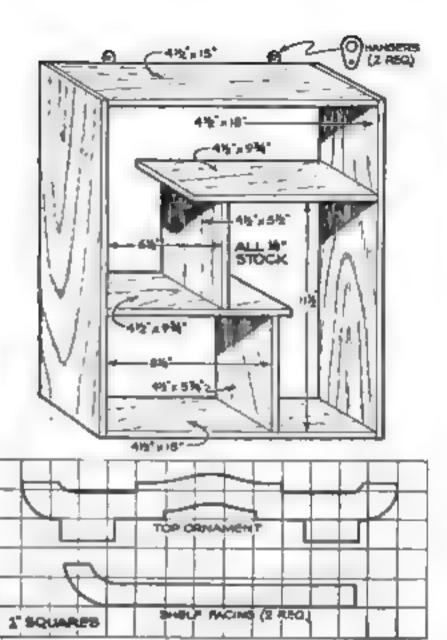
THIS Chinese modern wall shelf for figurnes or knickknacks looks like a much heavier and more complicated job than it is. Actually, it's a hand-tool job, made of X" plywood. Only simple butt joints are used. The X" by X" facing around the sides and on the shelves and shelf supports gives the appearance of heavier pieces of wood.

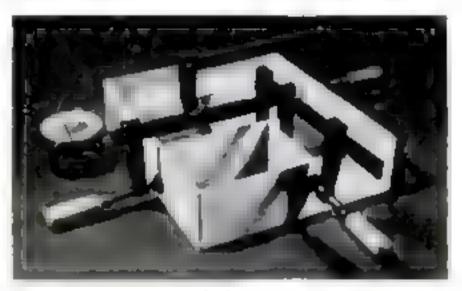
After you cut the parts to size, assemble three of the sides—not the top—with brads and glue. Leaving the top off allows the inner assembly to be inserted and bradded more easily. Assemble the shelves and supports as one unit and fasten them in place with glue and brads. Then attach the top of the box.

Use a coping saw to cut out the top ornament and glue it and the facings in place. Glue triangular blocks behind the ornament to give it added strength. After the glue has set, sand all parts smooth.

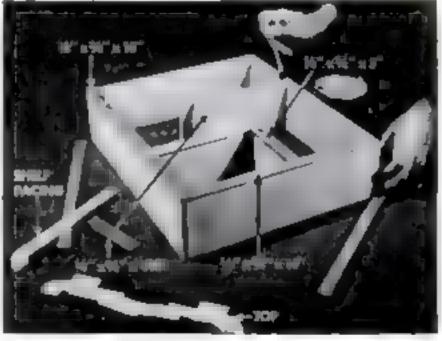
On the cabinet shown here, the outer surfaces of the four sides and the framing pieces were finished with black enamel. The interior was given two coats of Chinese red.

If you use fir plywood, you can get an unusual finish by going over the outer surfaces of the four sides with a wire wheel. This will remove the soft parts of the wood, leaving a roughened texture. Give these surfaces a thin coat of white paint or enamel and wipe it off before it has set. Some of the white will remain, giving a weathered appearance much the same as driftwood.—Whitney K. Towers, Los Angeles.





The two shelves and their supports are assembled as one unit and glued and bradded into the outer section. This shows clamp setup.



Glue is applied to the front edges of the shelves, the shelf supports, and the four sides. The framing pieces are then clamped in place.

## You Will Soon See Panels Made out of Chips

A NEW wood panel made of wood chips and shavings and from one quarter to a third cheaper than the cheapest plywood is scheduled to be on the market by the end of this year. The new product, called Novoply, can be sawed, planed, drilled nailed, and otherwise worked with ordinary woodworking tools. It can be painted, varnished, or given other finishes.

The core of the panel is wood chips. The two outer layers are wood shavings. Waste wood that makes up the panel is treated with a synthetic resin and then pressed at 200 p.s.i. under heat to form panels 4' by 8' and 6' by 12' up to 1%" thick. Because it can be worked into curves, the product has been used in Europe in furniture manufacturing. It makes a solid, warp-resistant base for veneers.

Besides the low cost, the new panel-



Dimensional stability of new panel is good. These blinds are tied together at top and the sections pivot on pins in bottom and top.

called Novopan in Switzerland where it has been fabricated commercially since 1947—is good on two sides, has no grain rise, and will not burn readily.

The U.S. Plywood Corp. expects the first plant at Orangeburg, S.C., to produce between 40 and 50 million feet a year. At present the product is not for outdoor use although weatherproof panels have been fabricated experimentally.



Wood chips, left, form core of Novoply. Shavings, right, make up surfaces. Oak stain was applied to the dark half of the panel.

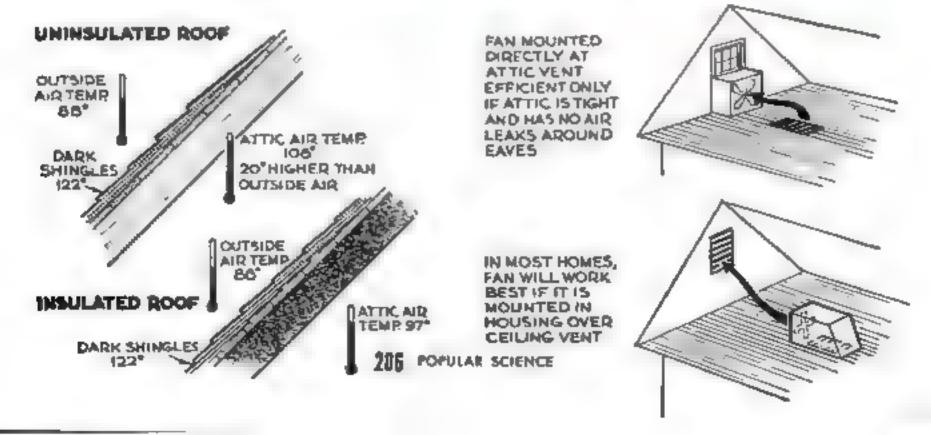


Some of the treatments Novoply can be given are shown here. Panels of different waste have different color but similar characteristics.



The difference between an insulated and an uninsulated roof can mean as much as 11" in attic temperatures. Dead air space in an unventilated attic acts as an efficient heat trap.

Attic fame can be mounted in two ways—at the attic window or louvered vent, or over an exhaust vent in the attic floor. If roof has air leaks, the latter position is the better.



There are plenty of simple tricks that you can use to keep your home more comfortable during hot weather.

#### By George H. Waltz, Jr.

Drawings by Sigman-Ward

THERE'S no reason why your house can-And there's no reason why you should spend a stack of money for the added comfort. Careful planning plus ingenuity can reduce the cost to a few dollars and a little week-end work.

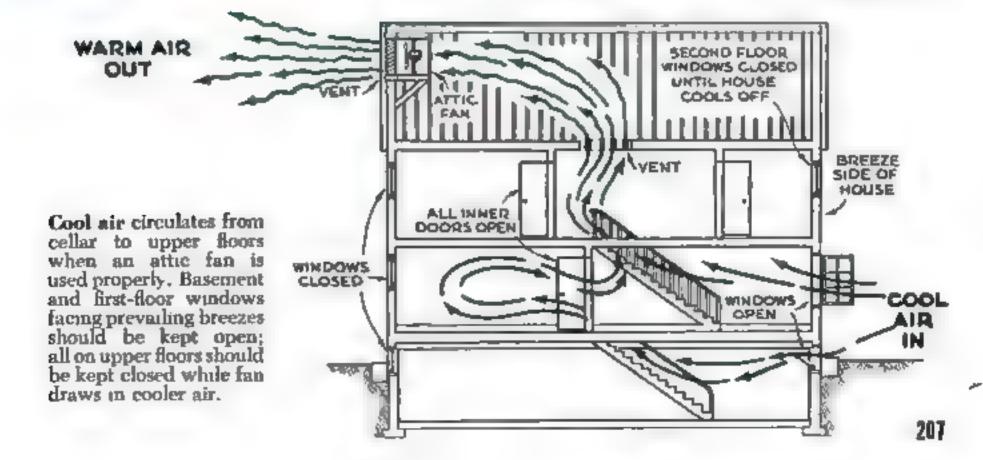
LOW SHEUES BORDERING CELLAE WINDOWS - CAN BE WEITED DOWN LACH EVENING GOOD GRIEN LAWIL WETTED DOWN EACH EVENING,

The way to keep a house cool is 1) to shut the blistering heat from the summer sun out of your rooms during the day, and 2) to take advantage of the usual nighttime drop in temperature. The things you can do to accomplish this range all the way from planting shrubs to building a room cooler.

The first thing to do is study your house. How is it situated with respect to the generally prevailing summer breezes? Which windows get the full brunt of the summer sun? Does it have a full cellar, with cellar windows? Is the roof insulated? Are the walls insulated? Is the attic closed or well ventilated?

Most American houses, unfortunately, are highly efficient heat traps. Once the ceilings, walls, and furnishings are thoroughly warmed in summer, they tend to hold the heat. By remaining warm, they prevent our bodies from losing heat-and we perspire and lose sleep-even though there may be cool air just outside the windows. The remedy is to get your house as cool as you can at night and then try to keep it that way as long as you can the next day.

Summer heat sneaks into a house mainly through the roof and the glass in windows. If you can barricade, even partially,





Special window screens will keep out direct rays, as well as insects, without interfering with view. Tiny horizontal slats placed at angle stop rays. Photo at left shows how sunlight passes unscreened window but is blocked by slats.

THIN BRONZE LATS SLANTED

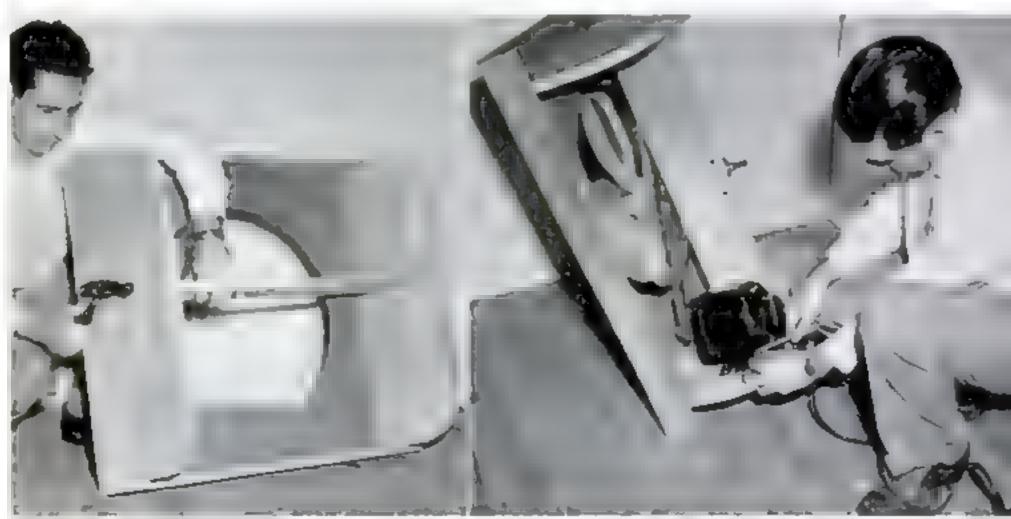
those two highways for heat, you can keep more than two-thirds of the added heat from the rays of a summer sun from getting in.

#### How to Keep Heat Out

Roof or attic-floor insulation, naturally, is one way to keep heat from coming in through the ceiling. Most of us think of insulation only as a means of saving fuel in the winter, but it also can help make us more comfortable in the summer. The insulating materials available range from metal foil to glass fiber. You can install some kinds your-

self; others require a professional's skill.

Quite a few things can be done about your windows. All of them, especially those on the sunny side of the house, should be kept closed during the day. Glass transmits about 85 percent of the heat that strikes it, though, so something more should be done. One old stand-by is to pull down the shades. This may slow down the heat-transfer process slightly, and help psychologically by keeping out the bright light. However, such experts as Dr. H. E. Landsberg of the U. S. Government Research and Development



You can make a window ventilator from some lumber, a fan and arbor, a motor, and a few square feet of metal grille. Frame is made of 1" lumber; back, from composition board.

Fan and motor should be bolted in place Rubber mountings are best. A 20" fan with 2h" pulley driven by 1/8 hp motor with 1h" pulley will circulate air in small house.

Board say it is far less effective than preventing the sun's rays from reaching the outer surface of the glass in the first place. Dr. Landsberg recommends old fashioned shut ters (painted white on both inner and outer surfaces) as one of the best barriers.

Canvas awnings, particularly ones with open sides that allow air to circulate, also do a good job. The same goes for decorative architectural overhangs and window trel-

lises covered with climbing vines.

Nowadays, you can also obtain heat-reflecting insect screens. They consist of thin strips of bronze or plastic that slant downward and outward. Thus they allow for light, ventilation, and a view, but prevent direct rays from the sun, as well as insects, from getting into the room.

#### How to Let Heat Escape

With roof and sunny windows well taken care of, your next step should be to provide an exit for heat that slips into your house despite your vigilance. This can be done by treating your house as though it were a chimney. Because hot air rises, the cellar normally will be the coolest spot in your house; the attic the hottest. It is not uncommon for the temperature in an unventilated attic under an uninsulated roof in midsummer to soar to 160° when it is only 90° outside. Such attic temperatures have

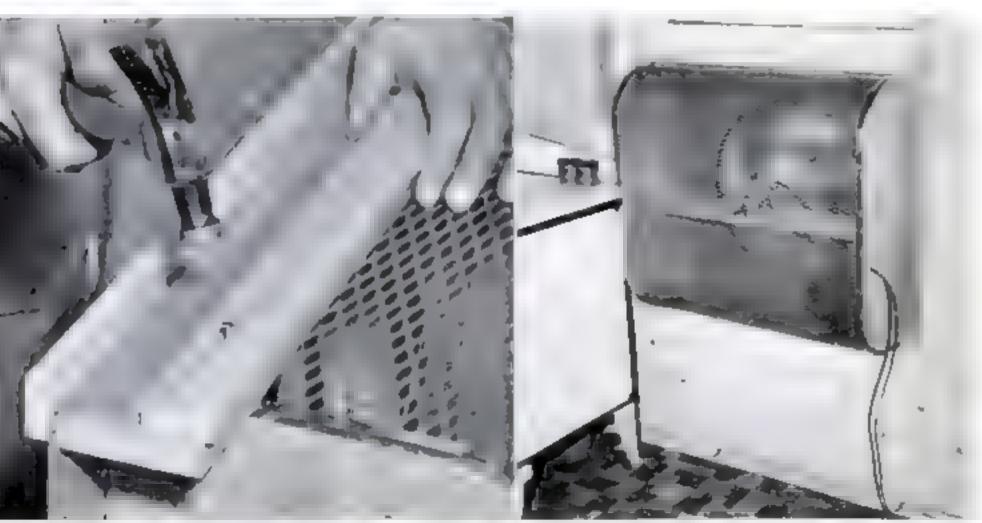
much the same effect as a network of radiantheating coils in your ceiling.

Your whole house will be cooler if you open the cellar windows that face the cooler, shadier side of your house, and ventilate your attic either by opening a window or installing ventilation louvers on the downwind side. Every little breeze that blows will then pull hot air out of the attic. How big should the window or louvers be? The experts recommend at least 30 sq. in. of opening for every 100 sq. ft. of attic floor.

Once your attic has some sort of ventilator, you will have an open top to your "chimney." Then, by keeping open all inside doors, including the cellar and attic doors, you can create a natural upward draft that will draw the warm air off from the top of the house and suck cooler air up from the cellar. This natural cooling system is generally most effective after the sun has gone down and outdoor temperatures start down.

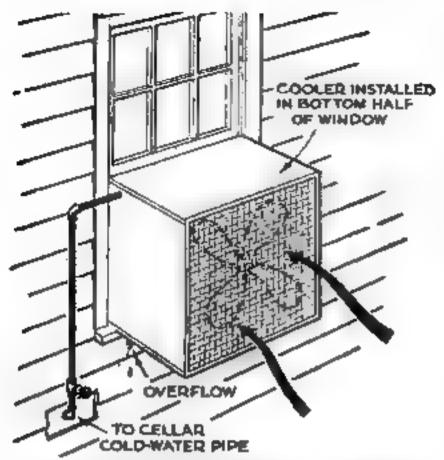
#### How to Shore Heat Out

You can increase the efficiency of your cellar-to-attic air-circulating system by inducing forced draft with an attic exhaust fan. Turned on a few hours every evening, it will pull cool air in through the cellar and ground-floor windows, circulate it through the house via the stair well, and expel through the attic ventilator. Soon

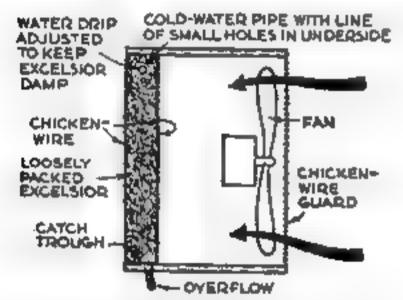


Metal grille, sometimes called "expanded metal," makes a good cover for the fan. Only the thinner gauges should be used, since the heavier gauges are difficult to work by hand.

The completed fan is held in place by the window sash itself. The fan housing is simply shipped into the window, as shown, and the sash is pulled down to grip the upper edge.



Evaporating water will help cool your bedroom if you build this window unit—a variation of a cooler improvised for many wartime barracks.



Fan blows air through filter of excetsior, which is continuously moistened by water dripping from pipe. Evaporation cools the incoming air.

the temperature of the walls, ceilings, and furnishings will be lowered. An attic fan can make a dent of as much as 15° in nighttime indoor temperatures, which can mean the difference between sleeping or not.

The fan can be mounted either right at the attic window or ventilator, or over an exhaust grille placed in the attic floor. If entrance to your attic is through a trap door, it can serve as the attic-floor exhaust vent. In either case, the fan should be mounted in a comparatively airtight housing.

The size of the fan you need depends on the size of your home and its geographic location. In the middle coastal states, about 30 air changes every hour are required to cool a house down to outdoor evening temperatures. In the broiling south, you may need as many as 50 or 60 air changes an hour. In the north, ten may be ample. These figures assume that you'll run the fan two or three hours every evening.

Determine the over-all cubic-foot capacity of your house, multiply that figure by the required number of air changes per hour, and divide by 60 to get the minimum cubic-foot-per-minute capacity that your fan should have. If you live where 20 air changes an hour are recommended, for example, and your house has 9,000 cu. ft. of space, you simply multiply 9,000 by 20 and divide by 60 to get a required air movement of 3,000 cu. ft. per min.

#### Try the Fan Test

If you are dubious about the value of such a cellar-to-attic ventilating system, experiment first with any fair-sized electric fan. Some warm night—that is, warm indoors and cooler outdoors—open the door to your attic, place the fan so that it will blow toward an open attic window, and let it run for four or five hours—or for the entire night. Even the relatively small amount of air that a small fan can push (the average room fan doesn't move much more than 900 cu. ft. per min.) is likely to make a noticeable difference.

Just as important as figuring the size of your attic fan is gauging the size of the exhaust opening in the attic floor or trap door. Allow about 2 sq. ft. of exhaust opening for every 1,000 cu. ft. per min. of fan capacity.

Although, at first glance, it would seem reasonable to suppose that a practical room cooler could be made from a secondhand mechanical refrigerator, this is rarely the case. A good room cooler, to provide adequate cooling, should be able to deliver about it ton of refrigeration; a big refrigerator (10 cu. ft.) gives only about 1/6 ton. (A "ton" of refrigeration is the cooling effect of a ton of ice melting in 24 hours.)

However, if you live in a part of the country where the over-all humidity in the summer is relatively low and where tap water is plentiful, you can borrow a trick from the Army. More than one uninsulated, wooden barrack that fringed World War II airfields in Arizona, New Mexico, and eastern California—which Bob Hope called "runways built in ovens"—was cooled at night with an improvised air conditioner. It consisted of a large electric fan mounted in a window housing that blew air on excelsior kept damp by dripping water. If you bay secondhand parts, the whole business shouldn't cost you more than \$10 or \$20.

#### Bookcase Lamp for End Table

THIS reading lamp packs its own ammunition. It holds reading matter as well as a light right up next to your easy chair. You can make this space-saver from four pieces of %" or %" lumber. Saw the stock to the dimensions shown and round off the upper corners of the upright members.

The next step is to drill a %" hole length-wise through the 9" upright. Some %" drills are long enough to reach half way through from both ends. If yours isn't, use a long-shaft electrician's drill. Sight carefully along the drill as you work and keep the drill straight or you may find the point coming through the side. As an aid in sighting, you can clamp on a vertical strip of wood and keep the drill parallel to it.

Mark and drill a hole in the base to correspond with the hole in the upright and groove the bottom of the base. Clue and nail the ends and center to the base.

Enlarge the top of the upright hole, squeeze in a few drops of glue or cement, and thread in a short %" pipe nipple, which



is actually about %" o. d. Leave about %" of the pipe exposed on top so that the base of the lamp socket can be serewed down over it.

Ease a length of lamp cord through the hole and wire the socket and plug. Cement cardboard or felt to the base to protect the table surface and to keep the lamp cord inside its groove.



Lamp wire passes through a %" hole that runs through the base and center upright. The base is grooved from the center to one edge to clear the wire.

The socket is attached by means of threaded pipe apple. Part of it is turned down into the wood, part sticks up and is serewed into the socket.



#### Restoring Scratched Linoleum

AREAS of your kitchen linoleum that have become scratched or marred can be improved in appearance by a little special treatment. First wash them. After they've dued, rub thoroughly with boiled linseed oil. Remove excess oil, allow to dry at least 48 hours, wash again, and apply a couple coats of wax. Hard wax, rubbed to a high polish, will give a satisfactory and durable finish.

#### Shade Conceals Cellar Shelves

An unstantly but necessary collection of soap boxes, polishes, and other household articles on shelves at the head of the cellar stairs spoils the appearance of a finished basement. A quick, simple, and inexpensive remedy is a 29-cent window shade, installed between the study supporting the shelves. Pulled down, it conceals everything.—Robert Hertzberg, Queens, N. Y.

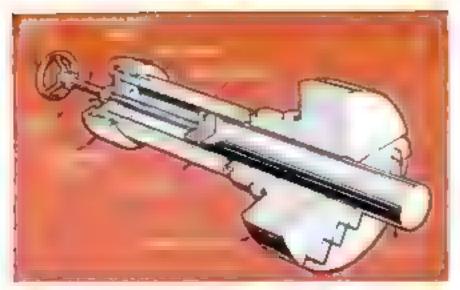


Rigid Boring-Bar Mount. The bar holder is often responsible for chattering when heavy boring cuts are taken on a small lathe. Here is a really substantial holder. It consists of two steel blocks, the lower one exactly as high as the distance from the top of the compound to lathecenter height. Clamp the blocks together to drill bolt holes through, and mark both for use in the same position as drilled.

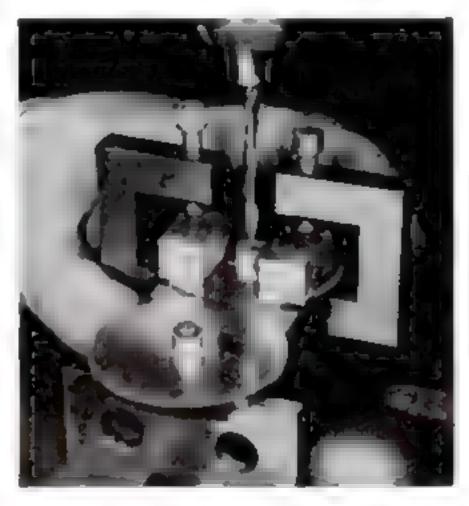
Make a shoe to fit into the tool-post slot and tap for the clamping bolts. With the blocks tightly clamped and at 90° to the lathe bed, put a drill in the chuck and run the carriage up to make the hole for the boring bar. If bars aren't held tightly, dress off the meeting faces of the blocks on emery cloth.—Joseph Tracy, Manhattan, N. Y.



Pulls Screws. In the aircraft factory where I work we often have to get out Philins screws having stripped slots, in which a Phillips screwdriver won't hold. We do it by drilling both ends of one slot at 45°, and using as big an ordinary screwdriver as will fit, sometimes tapping it in lightly. I've never seen this dodge fail.-Kenneth W. Mallison, Pacoima, Calif.



Spindle Stop Gauges Length. When work on limited production runs has to be held to close length limits, a carriage stop, plus the inside spindle stop shown, makes accuracy automatic. Reported by Herman Thoensen of E. Moline, Ill., in Warner & Swasey Company's Blue Chips, the device is being used on a saddle-type turnet lathe. Work is pushed in against the stop, the chuck tightened, and the end faced or shoulders turned to set lengths with automatic precision by the turnet tools.

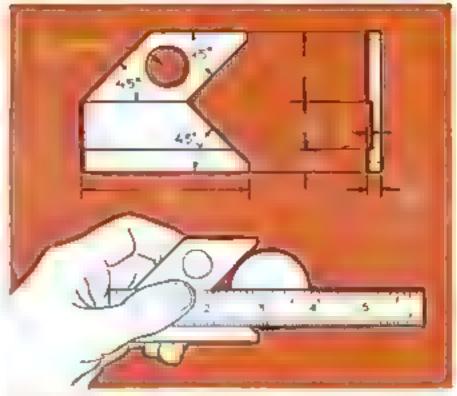


Gear Spots Its Own Center. When two or more gears are to be mounted, the critical job of locating them in proper mesh can be done with the gears. Mount the first on its shaft or pin. Then mesh the second with it and clamp this one. With a drill the same size as the hole in the gear, spot the mounting hole through it. If the gears are to go between two plates, clamp the plates together temporarily, with the gears outside for spotting.—J. C. Magee, Schenectady, N.Y.

Razor-Blade Gauges. By miking razor blades, you can collect an assortment of thicknesses for feeler gauges. Grind off the cutting edges, mark the thickness on each blade, and mount them on a bolt and nut.—Federico Strasser, Santiago, Chile.

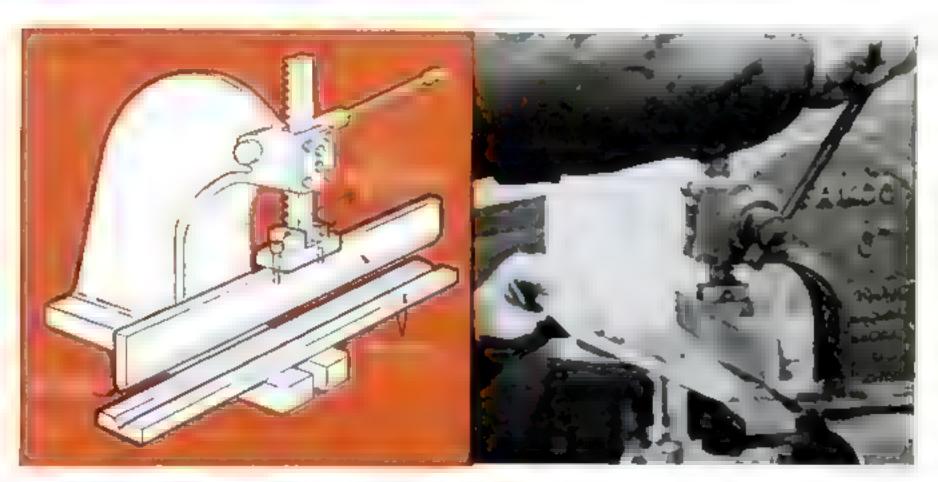


Holding Round Stock. If round work is allowed to roll on a bandsaw, it may strip off teeth, spoil the cut, or hurt the worker. To guard against this, clamp the work in a drill-press vise turned upside down, as shown. Short work can be held with a toolmaker's clamp held flat on the table.—Arthur R. Morgan, Naugatuck, Conn.



Tool Locates Centers. You'll find this gadget handy for spotting centers on round or square stock, as well as for squaring lines from an edge. A regular 6" steel rule fits into the groove. It's held by the thumb, while the tip of the forefinger in the hole supports the gauge.

Cut the groove first, in a piece of stock 3/16" by 2" by 2%", on a shaper or by filing. Then lay out the sides of the notch at 45° to the edges. Hacksaw roughly to shape. File to the lines and drill a 9/16" hole as shown in the drawing above.—H. L. Campbell, Oak Park, Ill.



Press Hends Sheet Metal. With a V blade mounted on the arbor or spindle, and a V block on the table, any arbor or drill press becomes a small sheet-metal bending brake. An adapter machined as in the drawing secures the V blade on an arbor press. For a drill press, bore a tapered hole

in the adapter to fit the spindle, or butt the adapter against the end of the quill.

To form small boxes by turning all four sides up around a bottom, or for other bends in tight quarters, substitute shorter V blades that will fit within any bends already made. —Samuel I. Kutner, New Rochelle, N.Y.



ACRYLATE, acetate, neoprene, styrenemaybe these are all Greek to you. But they belong to a new language, not an ancient one—the new language of the Age of Plastics.

Boil down a hundred and some trade names, and you'll find they designate about 18 kinds of plastics. You can identify these by home tests, and so determine whether an ornament can safely be washed in hot water, or a broken toy mended with a hot soldering iron, or lacquer thinner can be put in a container without dissolving it.

Originally considered substitutes, plastics are the dream stuff of modern industry. Want something that's transparent but unshatterable? A silk-sheer fiber with the tensile strength of iron wire? A "rubber" hose that will carry gasoline and stand heat? You can have them all—in plastics.

What's confusing is that the same plastic may be known by half a dozen trade names. The term Bakelite, on the other hand, can refer to any of four plastics. That's why it's best to know plastics by their chemical names.

All plastics belong to one of two main classes: thermoplastic and thermosetting. The chief difference is shown on the facing page.

Because heat will soften thermoplastics, some of them can be repaired by welding breaks together with heat. Thermoplastics can also be "cemented" with a suitable solvent that softens the joining surfaces and allows them to flow together. Solvents won't soften thermosetting plastics, but these can be patched together with certain cements.

Let's look at the plastics line-up, some of the trade names they go by, and a few of their uses.

Phenolics (thermosetting), most widely used of all plastics, are made by combining phenol (carbolic acid) with formaldehyde. They're hard, resistant to heat, water, and many chemicals, and are generally made in dark colors. Telephone instruments, electric plugs, and camera cases are made of phenolics. Trade names: Bakelite, Catalin, Durez, Gemstone, Indur, Marblette, Resmox, Uniplast.

Urea plastics (thermosetting) are made by reacting formaldehyde with urea, a compound of ammonia and carbon dioxide. Like phenolics, they're resistant to heat, water, and chemicals, but can be made in any color, including white. They are used for buttons, baking enamels, kitchenware, and certain



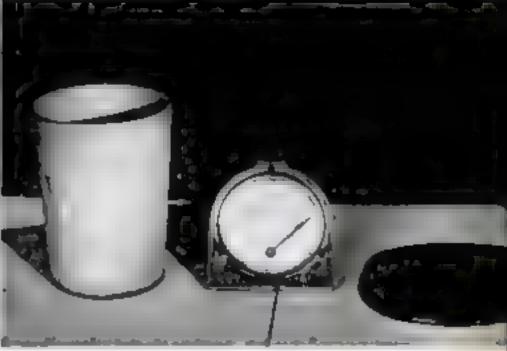
You can separate plastics into two main classes. Thermoplastic ones can be melted and recast again and again. Thermosetting plastics retain the shape they originally were molded in and cannot be melted and recast. Both have their advantages.

These pictures show the difference. The cup at the left in each photo is made of melamine, a thermosetting type. The one at the right is of polystyrene, a thermoplastic.

At about the temperature of boiling water (photo at right above) the polystyrene cup softens and begins to collapse. The other is unaffected. In photo at left below, at 375° the thermoplastic has become a blob. The melamine cup is beginning to blister and discolor.

At 550° (very hot baking oven) the polystyrene is a puddle. Though badly blistered, the thermosetting material retains its shape.





adhesives. Trade names: Bakelite, Beetle, Gemlite, Plaskon, Rhonite, and Sylplast.

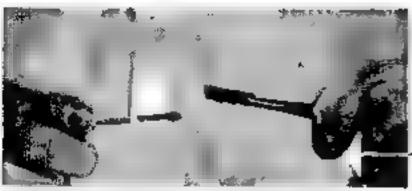
Melamines (thermosetting) come from formaldehyde and melamine, a synthetic organic chemical. They too can be produced in beautiful light colors, and have very hard surfaces, excellent electrical properties, and great water resistance. Melamines are used for airplane and tractor ignition parts, circuit breakers, dishes, and buttons. Trade names: Catalin Melamine, Melmac, and Plaskon Melamine.

Acetate or cellulose acetate (thermoplastic) is made from wood. It does not burn readily, is resistant to shock and impact, and may be produced in transparent colors. You will find it in soap dishes, steering wheels, safety film, eyeglass frames, toys, and lacquers. Trade names: Acetate Rayon,

Bakelite, Berkalm, Celluplastic, Clearsite, Kodapak, Lumarith, Nixonite, Tenite I, and Vuepak.

Acetobutyrate (thermoplastic) is very much like acetate, but more resistant to water and shrinkage and more easily molded. It can be made transparent or any color, and finds use in toothbrush handles, instrument dials, and radio cases. Trade names: Rexenite, Rextrude, and Tenite II.

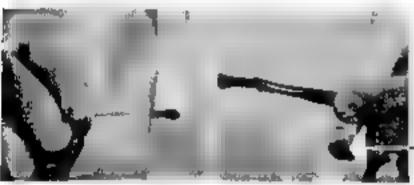
Nitrate (thermoplastic), also known as pyroxylin, is one of the oldest plastics. Made from wood or paper, it is extremely tough, water resistant, easily fabricated and colored. One great disadvantage is that it's highly combustible and tends to burst into flame if brought even near fire. For this reason, acetate has largely replaced nitrate. However, nitrate is used in tool handles, pens



No flame at all. The sample retains its shape.



Sample hurns but goes out when removed from flame. Return it just to edge of flame and note color characteristics it imparts.



Sample keeps on burning after removal from flame. Try to judge flame color during the first second that it's burning.

#### How to Make Match Tests

Cut or shave off a small piece of the plastic. Holding it in tweezers, let it barely touch the match flame. If it doesn't take fire, hold it there for not more than 10 seconds. Note the color it imparts to the flame. If it does burn, note its own flame color. After ten seconds, blow the flame out, smell the fumes given off by the smoldering plastic, and locate flame color and odor on the chart at right.

Tests should be made where there is no draft to disperse the odor. Don't blow out the match along with the plastic, or the match smell will confuse you. A Bunson burner is better because its flame is less luminous and it has no odor.

Five of the plastics appear twice in the table because their flame color changes after the first few moments of burning. Test some known samples if possible before tackling unknown ones.

COLOR AND MATURE OF FLAME	ODOR OF SMOLDERING PLASTIC	TYPE OF PLASTIC
	formaldehyde	UREA
	formaldekyde ples lishlike odor	MELAMINE
	formaldebyde plas carbotic acid	PHENOLIC
presenced green mes in finns	insent rubber	PLIOFILM
small green area with much yellow	forest religion	NEOPRENE
groon area	acrid but <u>nel</u> burnt cubber	MINAE
greek arek	SMAN	VINYLIDENE
green; sporks from burning plastic +	vinegar	ACETATE
intense white; burns florcely		HITRATE
mostly bine, white tip	floral, fruity ader	ACRYLATE
Mue	barning leaves or fresh colory	NATON
mostly bloo	weak, slightly sweet	FORMAL
bive; with sporks	rencid better	ACETO- BUTYRATE
blue; oo sparks	concld Sutter	BUTYRAL
yellenisk, bright green moutle	burst rubber	PLIOFILM
almett colorlest, putple mentle	vlasger	ACETAL
pollow-white laminess	rencid better	ACETO- OUTYRATE
yellow-white londness; smally	sweet floral	STYRENE
pellew-white huminass	week, slightly sweet	FORMAL
yellow-white luminous	burnt paper	CETTOTOSE
week; small groom reactio, much policer	hurst rubbee	NEOPRENE
yellour-green montle	vinegar	ACETATE
politor-group montle; borns well, cace started	slight, sweet	ETHYL CELLULOSE



Piping light around corners is a curious property of acrylic. Throat illuminators, indirectly lit auto instruments, and striking window displays make use of the phenomenon.



It melts away. Cellulose acetate dissolves readily in some solvents. Acetone, for one, puts a hole right through acetate rayon. Dissolve enough, and you have lacquer or nail pobsh

and pencils, watch crystals, and shoe heels Trade names: Amer-glo, Celastic, Celluloid, Herculoid, Kodaloid, Nitron, Pyralin, and Samson.

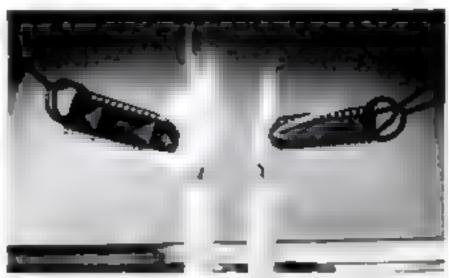
Ethyl Cellulose (thermoplastic) is made from wood and alcohol. Its best properties include low flammability, good electrical properties, acid resistance, toughness, and lightness. One of the newer plastics, it's used in airplane parts, electric appliances, wire coatings, ice trays, and hose nozzles. Trade names: Ethocel, Lumarith E.C., and Thermocast.

Cellulose (thermoplastic) is familiar under the trade name of Cellophane. Chemically it is nothing but transparent paper. What makes it so useful is its toughness in film form, plus its tastelessness and transparency. Trade names: Cellophane, Sylphrap, and, in fiber form, Ravon.

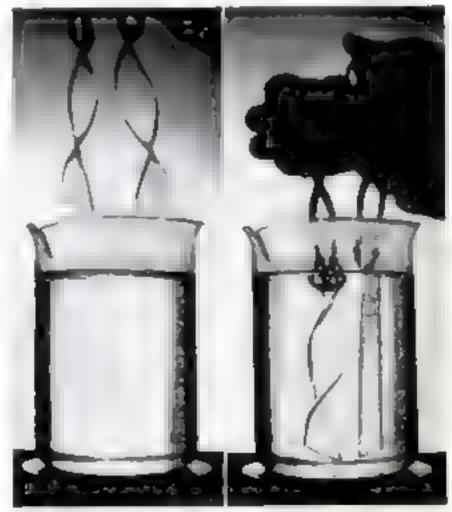
Pliofilm, a trade name, identifies a thermoplastic used as a more water-resistant packaging material. It's made from waste rubber and rubber products by treatment with hydrochlone acid gas.

Vinyl (thermoplastic) comes in the form of thin sheets and molding compounds, and may be flexible, elastic, or rigid. Vinyls are resistant to water and many chemicals, and do not burn. Things made of vinyl include suspenders and wrist-watch bands, shower curtains, raincoats, and phonograph records. Trade names: Flamenol, Koroseal, Phoflex, Vinylite, and, in fiber form, Vinyon.

Formal, Acetal, and Butyral (thermoplastic) find specific uses based upon their unique properties—toughness, moisture resistance, light and heat resistance, and ease of molding. They are used in safety glass,



They look alike, but cellulose nitrate movie film (left) burns furiously. Cellulose acetate film at right (safety film) burns almost reluctantly. This type costs more.



It "remembers." Heat a strip of polystyrene and another of acrylic, and twist both into spirals. Dropped into boiling water, the acrylic returns to strip form. Styrene stays twisted.

life rafts, army rameouts, and self-sealing gasoline tanks. Formal is called Formvar and Saflex-F; Acetal is called Alvar, and Butyral is called Butacite, Saflex, and Vinylite X.

Vinylidene plastics (thermoplastic), close relatives of the vinyls, are valuable for extreme resistance to water, solvents, concentrated acids and other chemicals, and for noncombustibility, toughness, colorability, and high tensile strength. Vinylidene has amazing wearing qualities, and therefore is used for seat covers, fishing leaders, netting, window screens, chemical pipes, clotheslines, and hoses. Trade names: Apla, Perflex, Saran, V.E.C., and Velon.

Styrene (thermoplastic) is made by a simple chemical process starting with benzene. The crystal-clear resin can be colored any shade desired. Its resistance to water, chemicals, and electricity is excellent. Styrene is used for dishes, radio insulators, lenses, and toys. Trade names: Bakelite, Loalin, Lustron, Polyflex, and Styron.

Acrylic plastics (thermoplastic) sometimes look very much like and are very frequently mistaken for styrene. But the acrylates range from soft sticky liquids to very hard thermoplastics. They have excellent transparency and colorability, weather resistance, lightness, and the strange property of piping light around curves. Acrylic is so easily colored to match gums and teeth that dentures are made of it. Uses include aircraft windows, lenses, safety goggles, musical reeds, and displays. Trade names: Acryloid, Crystolex, Lucite, Plexiglas, and Vernonite.

Nylon (thermoplastic) is familiar for its use in women's hose. But that's a minor application. Nylon can have a tensile strength of 58,000 pounds per square inch. Parachutes, tennis-racket strings, toothbrush bristles, fishing line, paint brushes, surgical thread, gears, and electrical switch parts are made of Nylon. It has no other name.

Neoprene (thermoplastic) is a trade name for polychloroprene, one of the first substitutes for rubber. Made by a completely synthetic process from two gases—chlorine and another similar to acetylene—it closely resembles rubber but is far superior in resistance to sunlight, oxygen, heat, oils, and solvents. It's used for flexible gas and oil hoses, electrical insulation and sockets, shoe soles, and military balloons.

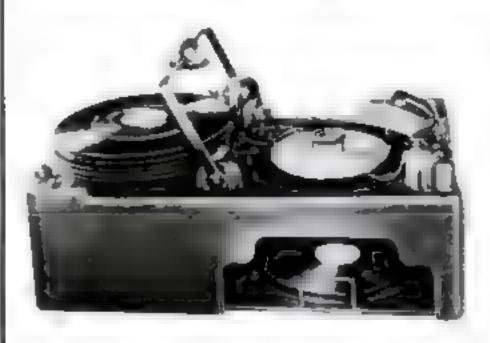
#### The Height of Ingenuity



There's one house-cleaning job I never liked: Getting dirt out of corners. How do you think I do the job now?

I whittled the handle of a long, round brush until it fitted the chuck of my husband's electric drill. Now the dirt flies out of corners when I turn on the juice.—Mrs. Adeline Rhoades, Omaha, Neb.

#### New Changer Turns Disks Over



A THREE-SPEED, fully automatic record changer that turns records over to play the second side is now available for custom intallations. The player handles all sizes of records in any sequence, the only manual operations being the selection of turntable speed and rotation of the cartridge to put the desired stylus in play. A full load of long-playing records will give up to 21 hours of continuous music. A load of 78-or 45-r.p.m. disks will play up to 3% hours. The changer is made by Lincoln Engineering Company, St. Louis, and lists for \$250.

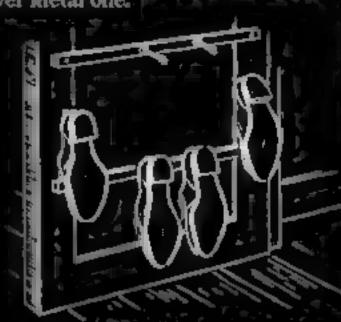
## Use a Doorstop

THAT rubber-tipped singer that sticks out from the baseboard wasn't put there just to trip you up. Its job is to keep the door from banging into the wall. But

it can do a lot of other jobs, too, as you can see in these sketches. A doorstop is a ready-made handle or peg and has a built-in screw so it can be attached to any piece of wood in a jiffy. For any of the applications pictured here you can use either the older wooden type of stop or the newer metal one.



Need an awi? All you have to do is file down the screw threads of a doorstop, it's a perfect tool for piercing leather, making punch marks, or scribing,



Do shoes clutter your closet floor? Here's a rack that will keep them in line. Just screw in a row of doorstops on the wall or door and hong the shoes in place.



A morturboard is any old board with a doorstop acrewed to the bottom. Use wood about it thick and shorten the acrew so it won't stick through the working surface.

sanding blocks. A doorstop attached to a block
provides a better grip,
maker it easier to use.
For lengthwise work,
serew stops into both
ends of the block. Doorstop handles of this type
can be adapted to scrubbing brushes, scrapers,
and the like.



Put cont hangers to full use by adding hat hangers to them. A doorstop fastened to the center of a hanger makes it a two-in-one clothing rack.

# How to Make Dovetails with Power Tools

#### By Edwin M. Love

VOU can well be proud of a nicely fitted I dovetail joint. Dovetailed drawers are a mark of fine cabinetmaking, but few craftsmen have time to fit a number of drawers by hand. Machine-made dovetails are the answer.

A drill press can be used to make perfect half-blind dovetails if you have the inexpensive jig shown. A drawer front and side are clamped in this jig, which is moved by hand against a rotating cutter. A metal comb guides it as it forms pins and sockets in both pieces simultaneously.

A circular saw, fitted with a dado head and a spacing jig, will cut plain dovetail joints requiring only a little hand trimming.

A bandsaw or jigsaw will cut various

dovetails without extra equipment.

Mortises for half-lap work can be bored to depth on a drill press. This removes most of the waste, leaving less chisel work. End dovetailing is possible with a dovetail router in the drill press, or by dadoing on a circular saw.

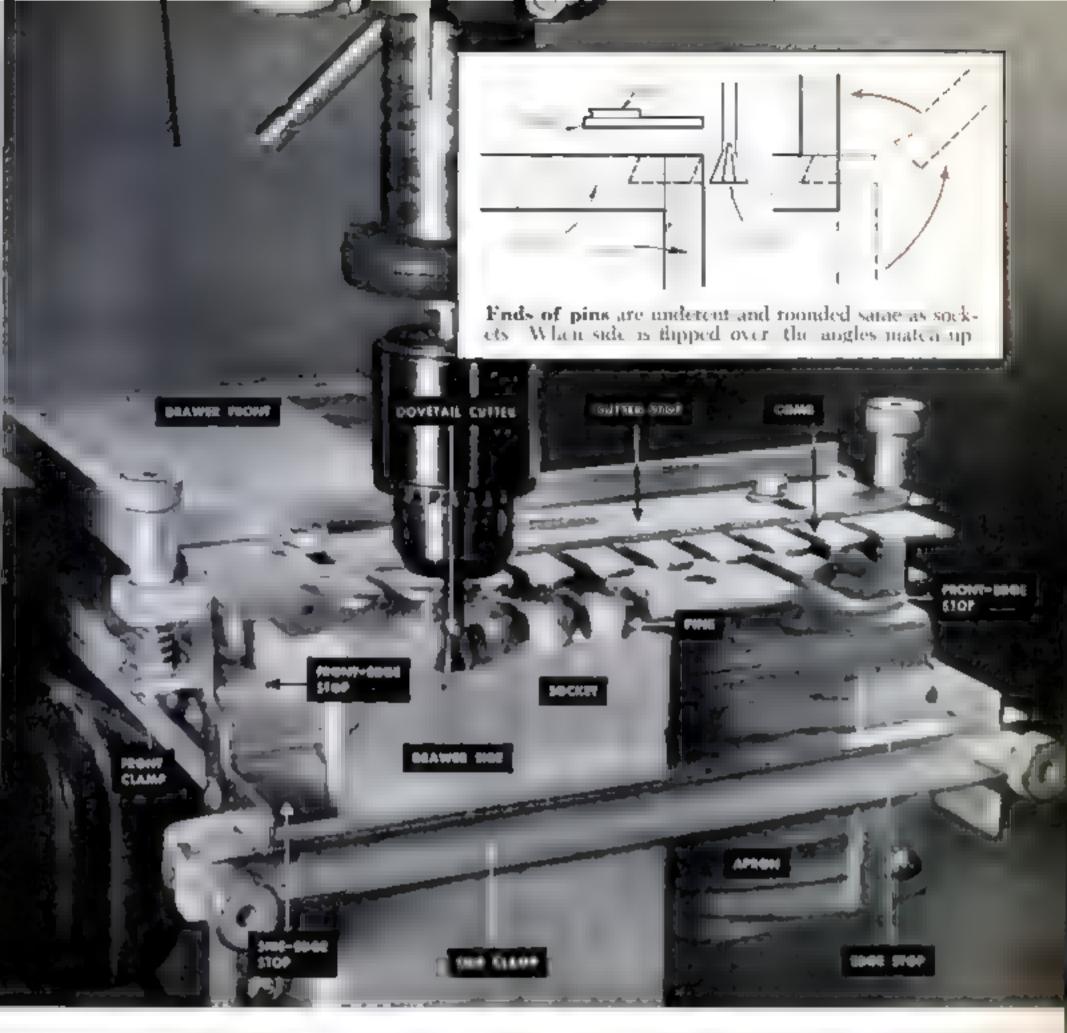


Dovetailing attachment. This accessory slides freely on the drill-press table, which is swung to center the quill about 1" outside the end of the jig, as in the photos. The dovetail router must have cutter and shank diameters as specified for the jig, or the joint will not fit. If your drill press has a tapered spindle, use a lock-on collet.

After the drawer parts are cut square and to length, clamp the drawer front under the upper hold-down bar, its end flush with the apron of the jig, and one edge against an edge stop. Clamp a drawer side against the vertical apron of the jig, aligning its upper edge with the uppermost face of the clamped front, and butt it against the side stop. The two pieces are offset by the stops

so that the spaces in both can be cut in line with each other-while on assembly, spaces will line up with pms, the edges being flush. The exposed faces will go inside the drawer.

Align the tips of the comb fingers with the exposed face of the drawer side. Then set the stop plate on top of the comb back from the tips a distance twice the thickness of the side, minus %", for the jig shown. This attachment cuts pins %" long and 9/16" thick, regardless of the thickness of the stock. If the drawer side is thicker than 9/16", the stop isn't used, and the comb is moved back the extra thickness to let the router shank go 7/16" back from the edge of the drawer front. The router will then cut back the pins, leaving them 9/16" thick.



It's good practice to set the drawer sides in from the ends of the front, making a lip or rabbet on the latter. Then the front can be dressed to fit its opening with minimum clearance, while the sides will be set in enough to slide freely. To do this, set the router stop back twice the thickness of the side, plus the width of the rabbet, minus ." Cut the rabbet after the dovetails are made

Lock the quill to make the router cut to a depth of %". Shift the belt for highest speed and pull the jig against the router. The outer faces of the pins will be rounded to fit the socket ends formed by the cutter

In cutting the opposite end of the front and its mating side, clamp both pieces at the other end of the jig, using the second pair of edge stops. Thus in a drawer with dovetail joints all around, diagonally opposite corners will be cut at the right side of the dovetuing ug, the other two at the left.

Since the dovetail spacing is fixed by the ng, the tails at the two ends will not be the same distance from the top and bottom edges unless the drawer width is scaled to suit. This can be overcome by inserting spacer strips between edges and edge stops.

Sawing through doretails. On the circular saw, you can get a handmade effect by making the pins much wider than the sockets. Mount a dado head with spacers to cut the minimum width between the pins, and tilt the arbor or table 20°. Clamp a wood auxiliary head to the miter gauge.

run it over the blade to cut a shallow notch, and glue in a small block to project 1"... Now shift the piece to the right on the miter gauge a distance equal to the desired dovetail spacing and screw it fast. In use, the saw will cut a second notch in the head

On one of a pair of sides mark the first cut to be made. Holding both sides vertically, ends down on the table against the auxiliary head, pass them over the saw. Lift the pieces and set the cut kerf over the projecting block, make the second pass, and so on. This cuts one side of all the pins. Now turn the pieces with the opposite face

After cutting one side of all pins as in the top photo, turn work 180° to cut other sides (center photo), pressing sides of new kerfs against the spacing block. Sockets are cut with the table level but miter gauge at 20°. Use a second auxiliary head (lower drawing at right) or scribe sockets from pins in joining member. In this case, standing belond saw and pulling work toward you (lower photo) gives view of lines.

against the auxiliary head, and cut the other side. Chisel out the little triangular stubs.

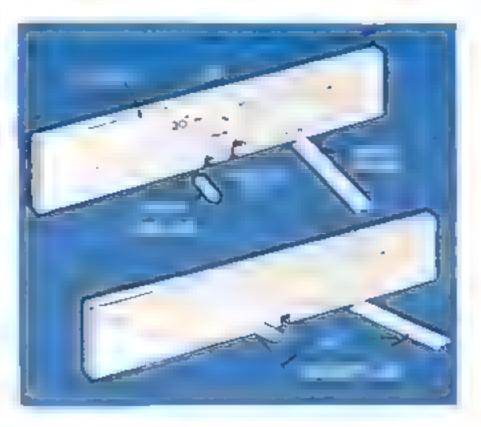
For the sockets in the mating members, the cut is made with the table or arbor level, but with the miter gauge swung to 20°. Make a second auxiliary head, clamp it on, cut a notch, and glue in a block as shown below. Use one of the sides on which pins have been cut to mark the socket spacing on the head and the first socket location on the work. Drop each cut successively on the locating block. To saw the other side, swing the miter gauge 20° the other way. Turn the auxiliary head upside down and set a new block.

Half-blind sockets can't be sawed, but most of the waste can be bored out on the drill press. Set the spindle depth gauge to stop the bit at the bottom of the socket, and chisel out the corners afterward

Bandsawing dovetails. The way a bandsaw can tackle thick stock makes it a natural for dovetailing several drawer sides at a time. Tack the pieces in a stack, laying out pins on the top one as for hand work. Cut the sides with a wide blade. Then bore out the waste between on the drill press. Nibble out the bottoms on the bandsaw.

Using a sidepiece as a template, scribe the sockets on the joining piece. Tilt the bandsaw table to the required slope, and cut the sockets in one piece at a time. If the table won't tilt sufficiently in both directions, clamp on an auxiliary table, propping up one side with a block. Trim the corners of the sockets by nibbling straight in parallel to each side cut. Don't turn the work on the table, or you'll slope the bottom.

The pgsaw is, of course, used in the same way except that its capacity limits it to cutting a pair of sides at a time. Both power





shown in the drawing, for joining posts and side panels or rails. Make cuts in the direction of the arrows in the drawing. Bore and chisel the blind sockets.

Half-lap devetails can be made in several ways. The devetailed end can be halved by ripping down the thickness and sawing the shoulder on a circular saw, bandsaw, or jigsaw, or by thinning it with a dado saw.

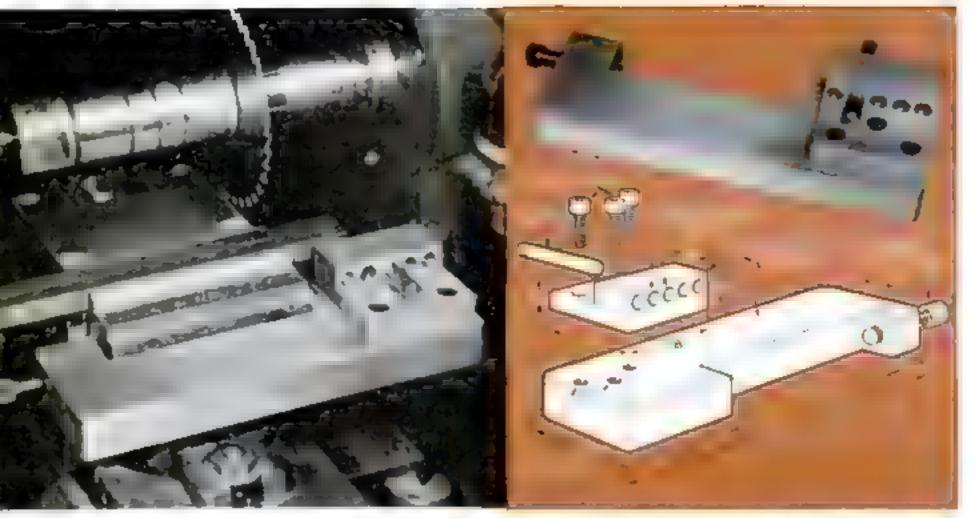
Ripping end-cleat dovetails. To form a dovetail groove in a cleat, mount a dado head, tilt the arbor or table, and run the work against the rip fence to cut one side of the groove. Turn the cleat end for end to rip the other side.

To dovetail the end of the board on which the cleat is to fit, leave the table tilted, set the fence to center the tenon correctly, and rip one cheek with a stiff blade, such as a single dado saw, as in the drawing below. Turn the opposite face of the work toward the fence to rip the other cheek. Then set the saw or table square, and with the board face down, cut the shoulders.





A dovetail router can form end-cleat joints on a combination power tool like that above, since the saw table can be set below and outside the spindle. Clamped-on wood strips form a fence. The groove is cut as in top photo. Then the tenon is made by running work under the cutter for each cheek (second photo). If the tenon is tight, make another pass with a sheet of paper under the board. Assemble joint without glue.



### Pin Gauges Cutoffs in Milling-Machine Vise

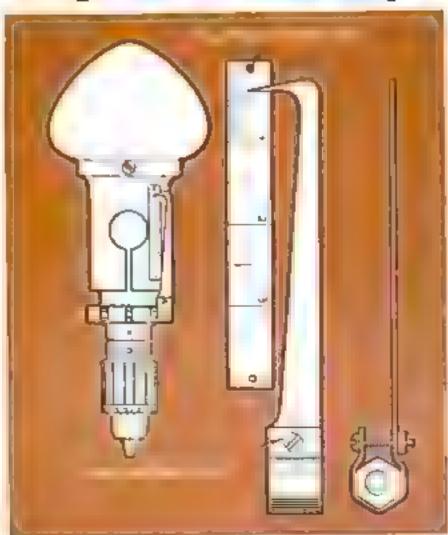
EVEN if only a few pieces are to be cut off in the milling machine, this gauge is worth while for the speed and accuracy it affords. It also eliminates the dangerous practice of reaching behind the cutter with a scale to set each cut.

As each piece is cut, after the stock has been pushed against the pin and the vise tightened, the pin is pulled back. The piece then falls free when cut off; it cannot jam between cutter and stop, as with fixed stops, and so break the cutter.

Dimensions given are for a 3%" milling vise. For others, change the notch dimension to suit. Mount the locating block with three small bolts. Polish the locating pin to a snug sliding fit in the reamed holes.

Besides cutoffs, the gauge is useful for many jobs that take accurate positioning in the vise.—J. C. Magee, Schenectady, N.Y.

### Simple Parts Add Depth Scale to Drill Press



You needn't do without a depth-drilling scale just because your drill press didn't come with one. Mount a 4" length of carpenter's rule on the drill-press head with escutcheon pins driven into undersized holes. Bend a strip of sheet metal as shown to fit around the hex nut on the clamping ring. Or, instead, drill a hole in the ring and drive in a bent piece of heavy wire for a pointer.—Fred Strickland, Portland, Ore.

### **Double Setscrews Can't Loosen**

The rounded setscrews used in light machinery, especially in the home shop, often loosen because of vibration. A solution that has worked fine for me is to replace the usual long setscrew with two short ones, one on top of the other. The lower one is tightened hard on the shaft. The second, tightened above it, locks both of them for keeps.—John C. Martin, Kings Point, N. Y.

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### Attic Acrial Keeps Roof Clear

A TELEVISION antenna that you can hide in your attic may work as well as one on the roof. Smoke, soot, or chemical deposits won't reduce its efficiency, and it won't mar the appearance of your home. The Attic V Beam is described by its makers, Telrex, Inc., Asbury Park, N. J., as a full-scale, high-sensitivity antenna that can be placed on the attic floor or hung from the rafters. Its arms are hinged to make it easy to put it on the beam.



### Mending Strips Speed Repairs

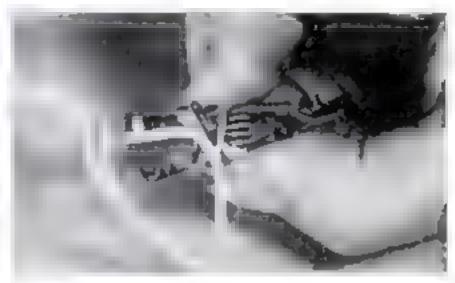
A VERSATELE mending strip that looks like a row of diamond-shaped holes can be used for many household repairs. Fix-O-Strips, marketed by Jayson Strips Co., Brooklyn, N. Y., can easily be broken off to any desired length or bent smoothly around corners or curves. The metal strips will join, reinforce, or support almost any type of material; the holes accommodate tacks, rivets, screws, or nails.



### Recorder Works on Batteries

Acompletely portable recording and playback machine weighing only 8 lb. operates on self-contained batteries. The new Walkie-Recordull, made by Miles Reproducer Co., Inc., New York, cuts sound tracks on an endless plastic film. It can record continuously for over three hours.





### Clip Tooth Pierces Insulation

Temporary electrical connections can be made more quickly and securely with this new Needle Clip. A sharp pin set rigidly in one jaw of the clip digs through insulation to make the electrical contact with the wire underneath. Mueller Electric Co., Cleveland, makes the device.

# Make Things Obey

By building voice switches, you can cause all sorts of things to happen when you say the word.

### By Karl Greif

THERE'S power in your voice. Lake your hands and feet, it can be used to make many kinds of apparatus heed your wishes.

Three sound-operated switches that are easy to build and a pleasure to use are described in the three articles that follow. These devices turn words and syllables into electrical impulses that open and close relays. The result is the same as if you reached out and turned switches.

The sketch at the right shows you what happens. The microphone converts sound

### This simple one-tube unit is all it takes to run a model train.

This one-tube voice switch will make standard remote-control locomotives of the type used in many model-train sets do what you tell them. These engines have sequence selectors that make the cars stop, start, or back up when a switch is pushed.

The switch momentarily breaks the flow

The switch inclined that is not now in the same in the

A child can learn to operate this voice controller. It is connected by four wires between the train transformer and the track.

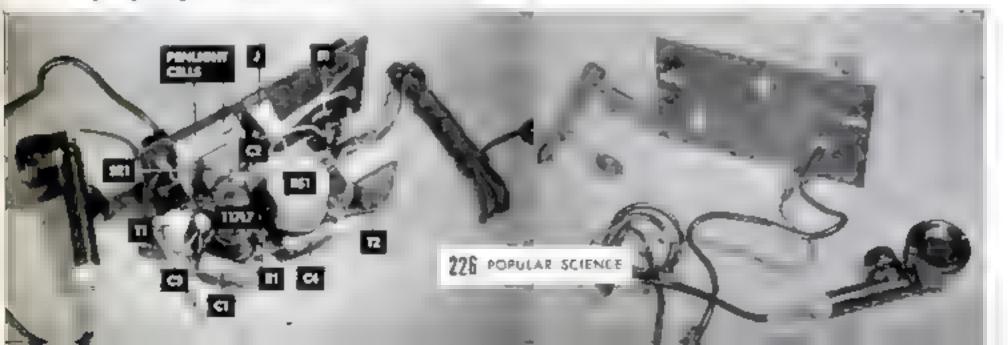
Two penlight cells in senes provide the mike voltage. If the relay tends to stick, adjust the spring or put a piece of paper over the pole.

of current to the track. Each interruption moves the selector one notch. If the train is going forward, the first interruption brings it to a halt, the next sends it into reverse, then stop, forward, stop, and so on. Since the locomotive is built to do this, the control mechanism only has to meter your speech and change sounds into pulses. Each pulse closes a relay and interrupts the current flow.

Parts for this control unit were selected for economy and simplicity. The carbon microphone, for example, is a war-surplus item still available at a low price. The 117L7 is a good tube choice because it operates directly off the line and needs no filament transformer. It also contains its own rectifier diode.

You may have to experiment a bit to find the proper connections to the output transformer, T2. This can be done after the wiring is completed and the unit is in operation. If you have a voltmeter, clip the prods across the relay coil and whistle a steady note into the microphone. Note the voltage, reverse the leads to the transformer secondary, and repeat the test. Make the final connections to whichever taps give the highest output.

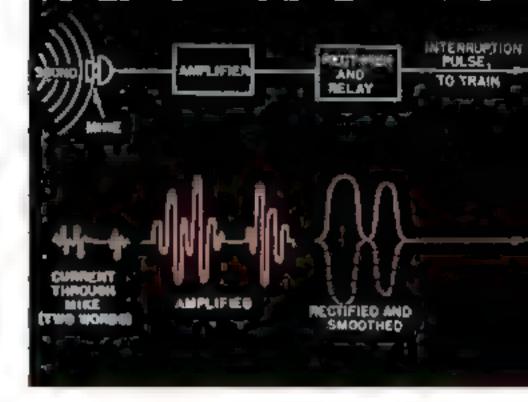
If the relay picks up when you press the talk switch on the mike, remove the switch spring and lubricate the slide with petroleum jelly.



## Your Voice

into alternating current. An amphier puts muscle into this AC signal. It then is rectified and filtered into separate pulses of direct current that are fed to a relay.

What kind of sound do you need to make a pulse? That depends on the filtering. By choosing the right components you can mold the action of the relay to respond to long or short words or syllables.



You don't have to make any changes in the train equipment. While the relay is in the up (normal) position, current flows from the trun transformer to the track just as if the voice switch weren't there. But when a sound energizes the relay, the contact arm falls and interrupts the circuit.

Give yourself a practice workout with the

train controller before putting it on display. By spacing such words and phrases as "Stop," "Forward," "Now go back," and the like, you can advance the selector relay one, two, three, or more steps at a time. The trains will respond to any sound pulse. You have to pick the right number of words to make them do as you tell them.

H1: 150-ohm, 1-watt carbon.
H2: 30-ohm, 1-watt carbon.
H3: 5,000-ohm, 1-watt carbon.
C1: 10-mfd., 25-volt electrosyue.
C2: 40-mfd., 150-volt elect.
C3: 20-mfd., 150-volt elect.
C4: 4-mfd., 50-volt elect.

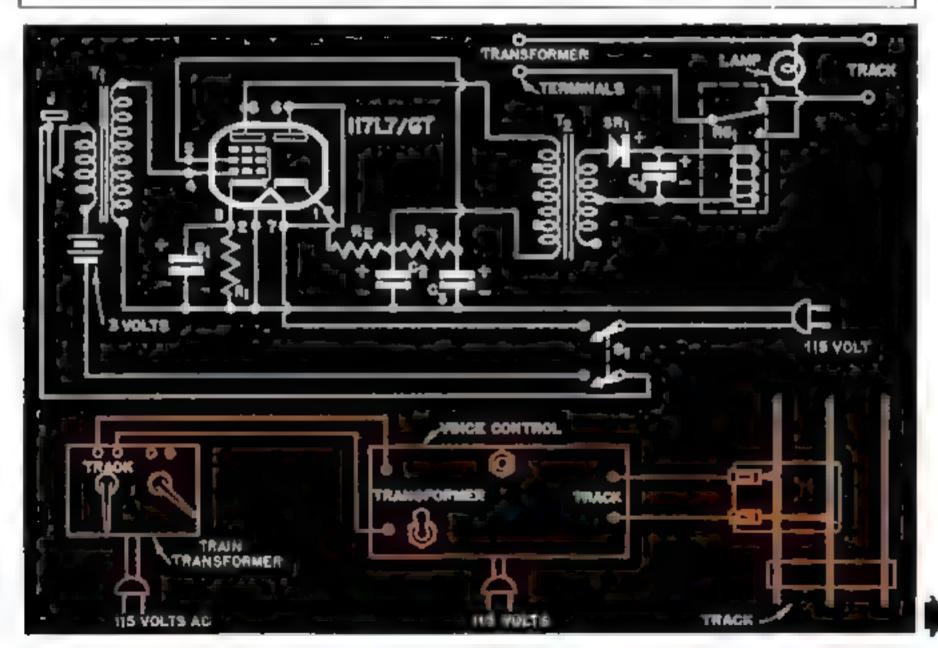
T1. Single-button microphone transformer, aprox. 200-ohin pri to 80,000-ohm sec.

T2 Output trans, 10,000-ohm pri. to 2,5tiO-ohm sec

RS1 2,500-ohm SPDT plate-circuit relay.

SR1: 30-ma, dry-disk rectifler, S1: DPST toggle

 Single-button microphone jack. indicator must (name vodage as fram set), breadloard chases panel, dial-light assembly carbon mike (T-17 or other),



### Here's a robot that will term off radio commercials for you.

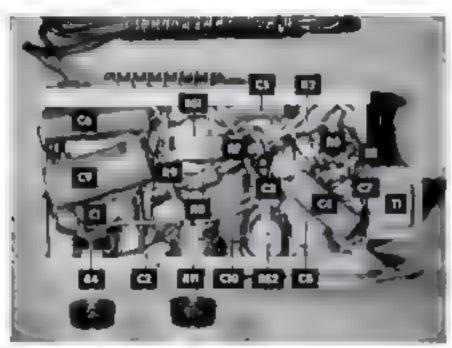


Connected to a bell and placed beside the baby's crib, this sound switch will set off a remote alarm whenever the baby cries.

Connected to a radio, thus box silences commercials on your spoken command. The radio will come on again after a period of quiet.



When using the timer circuit, turn on \$2 before setting the sensitivity control. Otherwise the click of the switch might trip the relay.



If you want the momentary contacts on RS1 to stay closed longer after the trigger sound stops, use a larger condenser in place of C10.

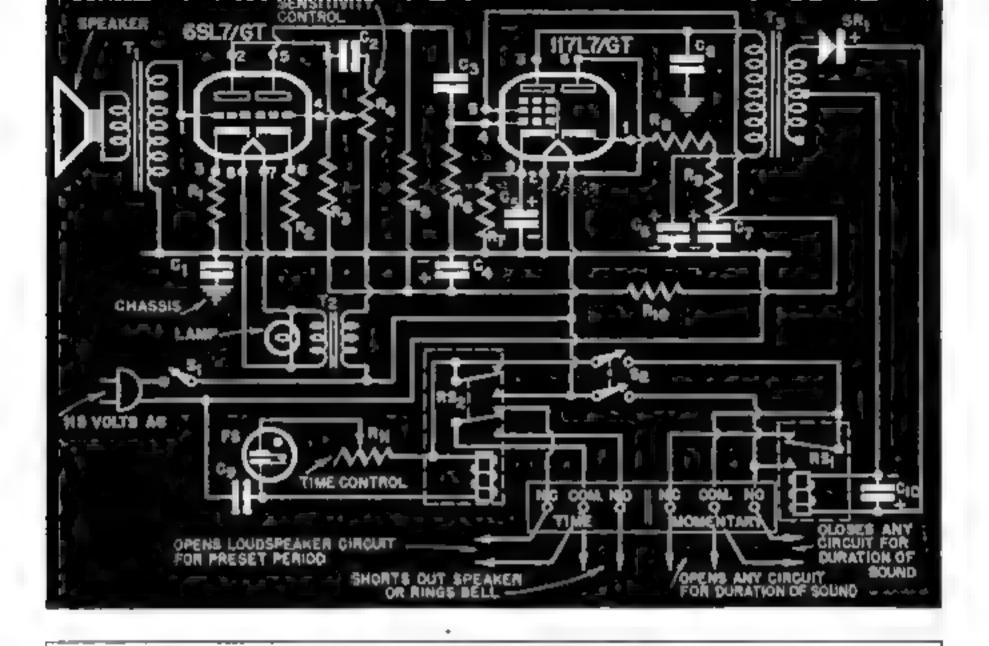
ADDING two circuits to the basic voice switch described on the previous pages will make it more versatile. With the electronic package pictured above, you can turn off the radio during commercials without going near it. All you do is call "Quietl" or even "Shaddupl" and the radio will be mute for about 45 seconds. A second use of the same device warms you in a distant part of the house whenever the baby cries.

One of the additional circuits is a timer that stretches out the switch action; the other is a preamplifier that increases sensitivity. The completed unit looks like a small radio, but in this case the speaker is used as a microphone.

The labeled photo at the left shows how the major parts are arranged. The high gain of the circuit makes their position rather critical. Note particularly that the shielded input transformer, T1, is placed at right angles to the output transformer, T3.

Two sets of terminals are attached to the rear edge of the chassis. One set provides momentary switching action, the other prolongs the action for a controlled period after the triggering sound impulse stops.

The time-delay circuit works like this: a sound picked up by the microphone-loud-speaker is turned into an electric pulse that energizes relay RS1. This relay remains picked up just long enough to close a second circuit and allow current to reach the coil of relay RS2, a 115-volt AC relay. This is wired in parallel with a fluorescent-lamp starter (FS) so any voltage that appears



### LIST OF PARTS

R1 3,000-ohm, 1-watt enrhon.
R2 2,500 ohm, 1 watt carbon.
R3 200,000-ohm, 1-watt carbon.
R4 500,000-ohm, 1-watt carbon.
R5 100,000-ohm, 1 watt carbon.
R6 500,000-ohm, 1 watt carbon.
R7 150-ohm, 1-watt carbon.
R8 15-ohm, 1-watt carbon.
R9, 5,000-ohm, 1-watt carbon.
R11: 500-ohm, 1-watt carbon.
R11: 500-ohm, 1-watt carbon.
R11: 500-ohm, 1-watt carbon.

C1: .1-mfd. 600-volt paper.

C2 .001-mfd , 400-volt paper
C3 .003-mtd .400-volt paper
C4 .20-mfd , 150-volt electrolytic.
C5 .10-mfd , 25-volt elect.
C6 .40-mfd , 150-volt elect.
C7 .20-mfd .150-volt elect.
C8 .002-mfd , 600-volt paper.
C9 .1-mfd .600-volt paper
C10 .4-mfd .50-volt elect.
T1 .fatercom input transformer, secondary approx. 25,000 ohms, priority to match 8 to 6-dimervolce-coil.

T2. 6.3-volt flament trans.

13. Output trans. aproc. 10,000ohm pri to 2.500-ohm see

RSt. 2.500-ohm SPDT plate-circuit relay.

RS2: 115-volt DPDT AC relay.

SR1: 50-ma. dry-disk rectifier

S1: SPST switch on R4

S2: DPST switch on R11

FS. 15-20 watt neon-type fluorescent starter.

6.3-volt rolot lamp, 5" PM speaker, 14" by 44" by 8" chassis.

across the relay coil also appears across the starter. When current flows through the starter, it heats the bimetal contacts and bends them till they finally touch. This lowers the voltage in the relay and ends the timing cycle. The time-control rheostat, R11, regulates the current through the starter and therefore the delay.

To use this unit as a radio silencer, connect either the normally-open (NO) time terminals across the voice coil of the radio's speaker or the normally-closed (NC) pair in series with one speaker lead. Turn on the time switch (S2) and set the time control to maximum. Then, while the radio is operating at normal volume, adjust the sensitivity control, R4. It should be below the point where the radio's sound can trigger the relay. A word or handelap will then silence the radio for about 45 seconds. It will come back on automatically.

The higher the sensitivity control is set,

the easier It will be to set off the device, but if the setting is too high it may respond to loud music, or an auto horn in the street, or even vigorous conversation. Sometimes the unit may have to be mounted on sponge rubber to keep it from reacting to vibrations other than a loud voice aimed directly at it.

To use this unit as a baby tender, connect the normally-open contacts either on "time" or "momentary" (depending on whether you want a long or short alarm) to a bell. Juice for the bell can be tapped off the 6-volt pilot-light terminals. Place the control box close to the crib, and place the alarm bell wherever you wish. Now when the baby cries, his voice will make the alarm bell ring.

This device also can be used as a night watchman, to make lights turn on, to trip a camera shutter, or to start or stop household appliances. For some of these purposes, however, relays capable of handling larger loads may be needed.

### Continuous-duty switch uses little power, keeps its ear cocked.



Intomatic garage doors a table looked open with this sound-operated switch. Mike is cushcones or reliber craft sed in a watert state room

THERE are a lot of applications in which voice switches have to be left on for long periods of time. In such cases it's important that the power consumption be head to a miniaum. Here's a circuit that will do it. It is built nound a gas discharge tabe known is a flaviatron

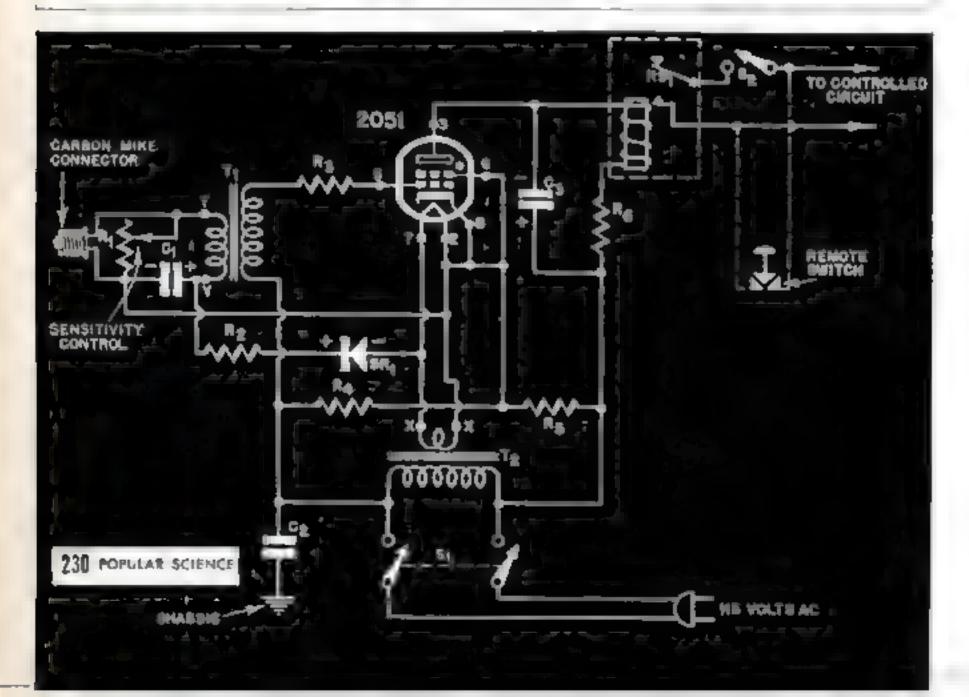
The special advintage of a theration is that it needs to DC and draws plate care to only when triggered. In other words, the only power used a c stand by operation is the small mount needed for the frame t and for the carbon manaphore sample

When a signal hats the inke it is stepped up through transformer 11 - ac respressed upon the gral of the tune. Voltage on the grad rackes the tube "Tre You know it's firms when you see a blue violet glow inside the bulb. What Imppens actionly is that the tube becomes conductive and starts drawing pulses of current frama the AC line The pulses energize the relay. The higher they also of the pulse smoothing corocuser, (3) the longer the relay will remain picked up after the firing in the tube stops. Higher values of 1,6 will also increase the time lag.

### LIST OF PARTS

- 1 300 ohr pet uborater has been sufficient

- No. 5 and Tax and Taxable
- I No late makes an 1 - 100 - 11 - 1 - 10 (SC-)
- T2 63 s d) filement trans (5 , 500 c) Sex select
- 71 75 M. The a level-of-tentair
- Calbon i ke, Cassa hilp





The wooden board on which the chassis rests can be screwed to a wall. The oversize chassis insures ample ventilation in tight quarters.

If the thyratron tends to fire too easily, increase the value of the bias resistor, R4; if it doesn't fire, try a smaller resistor.

The entire unit is built on a 3" by 5" by 10" chassis. The only critical part of the wiring is that referred to by the letters "x-x" and "y-y" in the diagram. The position of these leads controls the phasing of hum voltage in the mike circuit. If the tube is uncontrollable or tends to pulse erratically, reverse the connections at x-x or x-x.

The single-button carbon mike shown in the photos was removed from a surplus telephone handset. For most applications it is important to mount the microphone on sponge rubber. A water-inlet hood from a washing machine was used as a protective housing for the mike.

Relay contacts are connected to the circuit to be controlled. In this case it happened to be an automatic garage-door opener. Dotted lines in the diagram show how the original control switch was connected into this circuit.

In use, the sensitivity control (R1) must be set at a fairly low point so that it will respond to an auto horn sounded four or five feet away but ignore other noises.

Another application for this control is to turn on runway and landing lights at a private or unattended airport. The mike could be mounted on a sounding-board panel and located near the runway. When a pilot "buzzed" the airport, the roar of the motor would trigger the thyratron and turn on the field lights through a heavy-duty latching relay. An automatic timing circuit would have to be added to turn the lights off after a suitable interval. Automatic turnoff is important since the circuit is necessarily subject to chance noises.

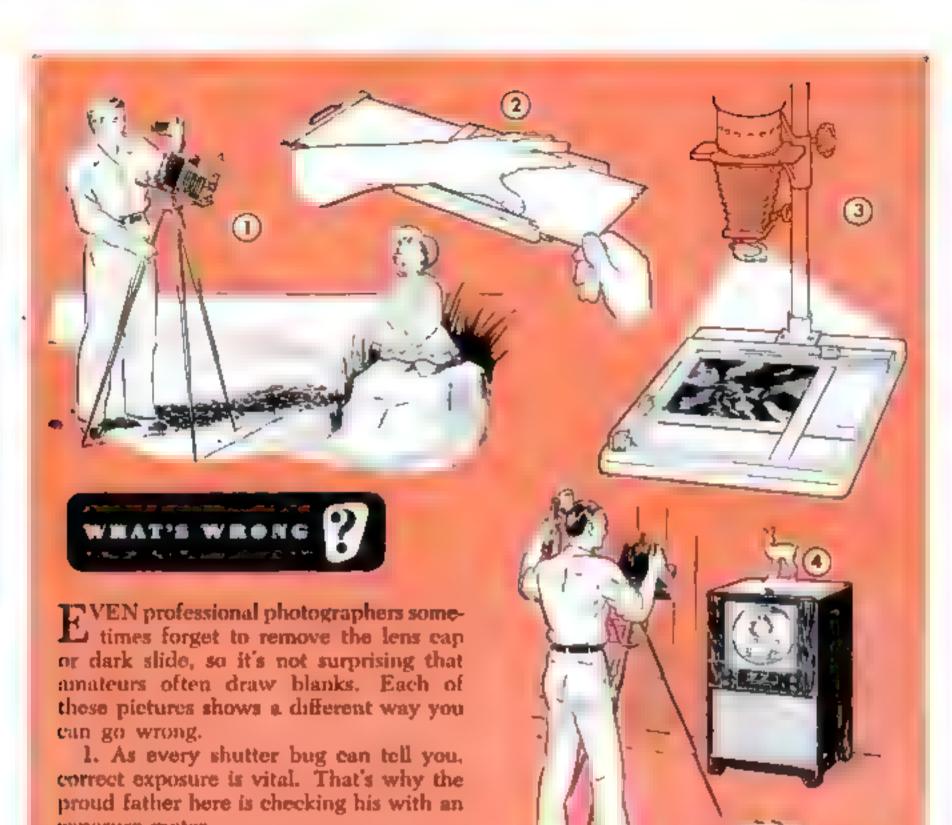
### Jumping Tests Your Shocks

The function of automobile shock absorbers is to dampen, or slow down, the up and down movement permitted by the springs. You can test whether yours are doing their job by standing on the front bumper and bouncing the chassis up and down. If it continues to bounce excessively after you get off, the front shock absorbers need attention, perhaps replacement. Jump on the rear bumper for a similar test of the shock absorbers at that end.

### Gluing Wood Controls Warping

Why is the top of a workbench usually made of several strips of wood glued together, rather than a solid piece?

There's a sound reason. Under changing chmatic conditions, any wood tends to warp and split. But if the wood is sawed into strips, rearranged, and then glued together, the tendency of one part to twist out of line is counteracted by the forces exerted by the others joined to it. This is a good point to remember in any woodworking job.



exposure meter. 2. Some tyros load their holders this way, may even get pretty fair pictures.

Most photographers make their own enlargements when they want good ones. But this fellow isn't doing so well.

4. Johnny's sister made a guest appearance on a TV show. He was all ready to record the event. Did he get a good photo?

5. Our nature lover felt fine when he finally coaxed a squirrel to sit still for a portrait. But even the squirrel was disappointed with the results.

eamers, the subject will be out of focus from about 8' to infinity. Thus close to the 5. Box cameras are generally fixed-focused

matter, but the angle is too high siste Tree with months afreid a beg also if is some it designate a light at a shadow to photograph the flash bulb, Shooting this way is like To high life 194 a odd 2d 20, no borlasw od isnj. lines said that it beseed in hald, they will 4. You can't flash a 7 / writer / Ladeo put.

at ly ldp I serve of built e ch fud late? े प्रस्त क्रिक्ट के स्वर्थ का स्वर्ध का स्वर्ध का अस्त है। Souther which tapeller are and the edges

bedeen disquiped that with the conting then faces you. Shooting through hand end of top edge. The light-sensitive to get the solidion with motifies at rightand would cover the identifying noted its loaded correctly, the thumb of the right I se film is reversed. If it were being to-idua etti mort beteetea tilautea (c) ort child. Meter should be held closer to measure with early and and so the combined form their to their mights the exposure meter too SZONSUL.



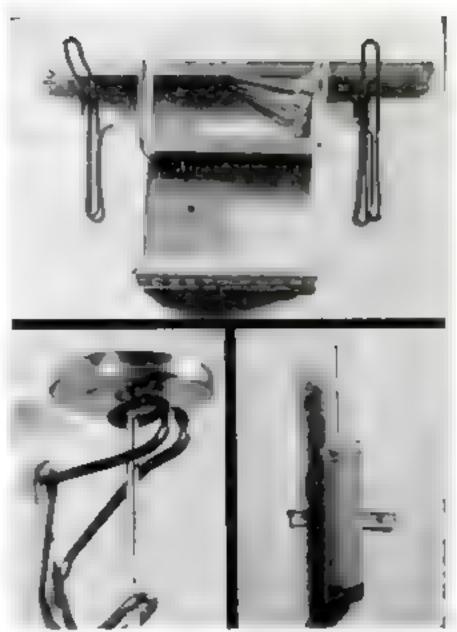
### Camera Shows Depth of Field

WITH the new 35-mm. Kodak Pony 135 camera, you can tell the range in which all objects in your picture will be in focus. Used with the focusing scale, figures on the shutter plate show the depth of field at all distances and lens openings. Shutter speed, lens opening, and distance figures are visible as you look down at the camera. Film stop and exposure counter are automatic. Like the Pony 828, the 135 has an f/4.5 lens and speeds up to 1/200 sec. Priced at about \$35, it takes 20- or 36-shot magazines, and has built-in flash synchronization.



### Sound for Home Movies

Movies and sound are automatically synchronized on 16-mm, sound film by the new Auricon Cine-Voice Camera above. Designed for the home movie maker, it records sound along one edge of the film. The camera takes 100-foot film spools. The \$700 out-fit includes a microphone, amphifier, head-phones, batteries, camera accessories, and fitted case. Lenses are extra. The outfit weighs about 34 pounds; camera alone, 12%.



### Store Accessories Out of Way

COAT hooks can be used in the photo darkroom for storing various accessories while not in use. Above are two examples. At top, film hangers are simply laid across two hooks screwed in the wall. At lower left, the top prong of the hook was bent up and back to provide a secure seat for a dial-type thermometer.

At lower right, the cap from an old fountain pen serves as a safe receptacle for another type of photo thermometer.



### Caster Ferrotypes Print Edge

THE edges of a ferrotyped print sometimes fail to take a gloss because of poor contact with the plate. To avoid this, go around the edges with a small rubber-roller easter after the print has been squeegeed.—John J. Rea, Urbana, Ill.

# I'd like to see them make . . .

Everyone has his own pet Idea of some gadget he would like to see in general use. What is YOURS? Popular Science will pay \$5.00 for each one published Use government postcards only. Contributions cannot be acknowledged or returned.



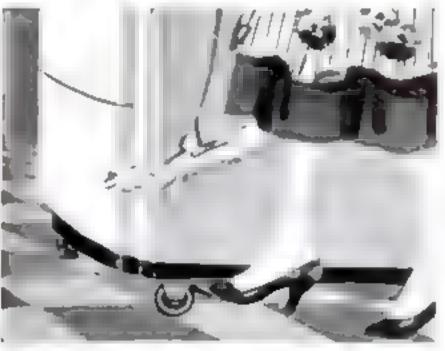
Clean-out plugs for the sewer pipe that have a removable center section to take a garden hose. When the drain was stopped up, you could insert the hose for forced flushing.—Mrs. Warren Bennett, Findlay, Ohio.



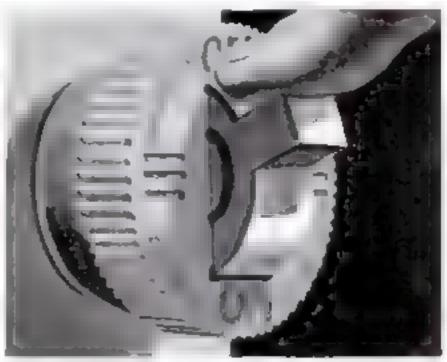
Hydraulic tow bars. These would be better than a towline since they'd take up the shock of starting when you towed another car. They should be small enough to fit the higgage compartment.—Theodore Huddle, Deadwood, S. D.



Left-hand threads on bottles of poison. Such threads, plus spikes on the cap, would warn you if you accidentally picked a poison bottle from a medicine chest in the dark, or when you're sleep-groggy.—John Boniella, Perryopolis, Pa.



Foot-treadle casters on electric refrigerators. By lowering the wheels, the refrigerator could be rolled away from the wall so the space behind and under it could be cleaned.—John S. Saviello, Arlington, N. J.



Circuit-breaker pluga. These plugs could be screwed into an ordinary home fuse box. Then when a short broke the circuit, you could just flip the lever to "on" instead of replacing a fuse. —Bill Hall, Eugene, Ore.

# Folding Bed Built in Open Boat

You can make overnight trips in your outboard runabout when it's fitted with a folding bed like this one. Four pieces of K" plywood make the bed for almost any 12' to 16' boat. All pieces are backed by 1\%" hardwood framing for strength and to prevent the pieces from slipping off the seats. Headrest, attached to back of front seat with loose-pin hinges, also doubles as seat back. Pins can be pulled and headrest placed in position on the front of the seat.—Clinton R. Hull, Costa Mesa, Calif.



Sleeping pad, sheets, and blankets make comfortable bed. On this runabout the canvas shelter is folded forward for this photo.



Hardwood ribs keep plywood sections from slipping off seats. Center sections, shown here, overlap front and rear scats by 1".



Legs hinged to top ribs of head and footrest convert them to tables for cooking and eating aboard. Bed roll is stowed forward.



Headrest is also back of front seat. Rope holds seat back up. Block on side of boat is one of pair that support headrest when bed is made up.



Looking forward. Headrest is in position as a seat back. Hinged legs of footrest have been folded, allowing footrest to drop out of way.

Details of chair are shown at right. Chair pivots on 2" pipe that is screwed into plate, 8" in diameter, bolted to the deck.





Fishing chair in use at left. Chair can be lifted off pedestal and pedestal unscrewed from deck plate for storage, leaving cockpit clear.

### Build Your Own Fishing Chair

COST of a fighting chair for battling biggame fish can run into hundreds of dollars—if you buy it ready-made. Frank J. Mather, sports fisherman of Woods Hole, Mass., built the one pictured here for about \$25. Only part he didn't build is the rodsocket assembly. Two pieces of \$" waterproof plywood make up the seat. The footrest is adjustable by changing the adjusting bolts to various holes in the \$" galvanized pipe.—Elan Jessup, Woods Hole, Mass.



Bottom of seat is pictured above to show nuts that hold arm-support flanges, which are mounted overhanging seat edges.

Arms being installed at right. Screwheaded &" brass bolts are used through the arms and flanges. Nuts and flanges are underneath arms.

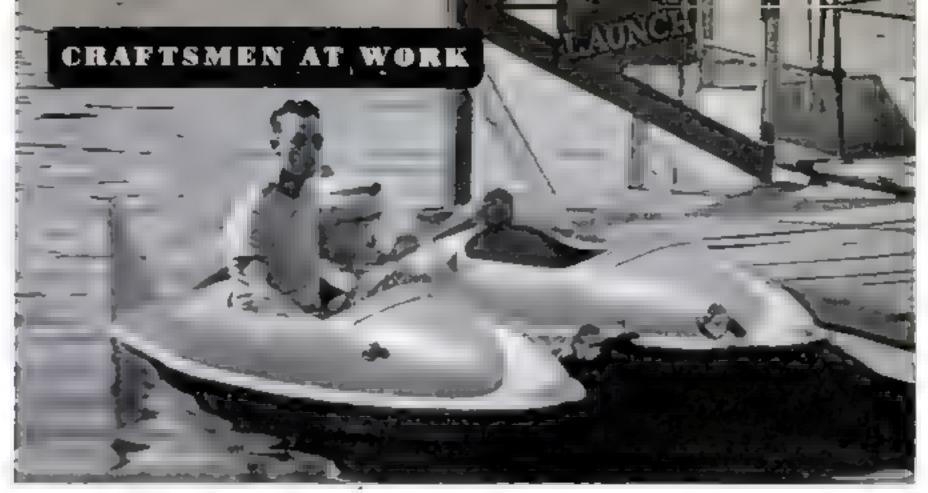




Details of under-seat assembly, left, Brass backing plate 7%" by 9" is screwed down. Flange is bolted down and 6" length of pipe

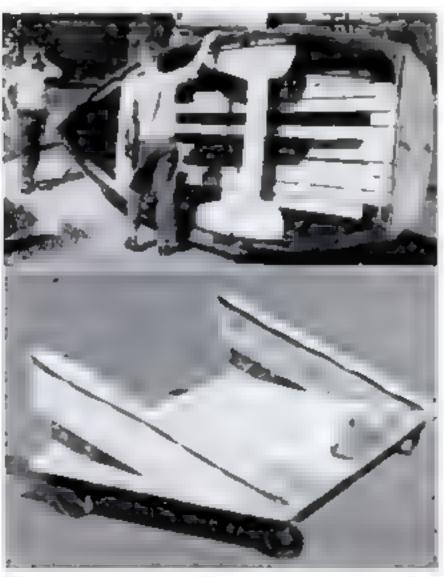


brazed to it. Top of 30" pedestal nests snugly in the 6" pipe so seat will pivot. Photo at right shows foot-brace installation of galvanized pipe.

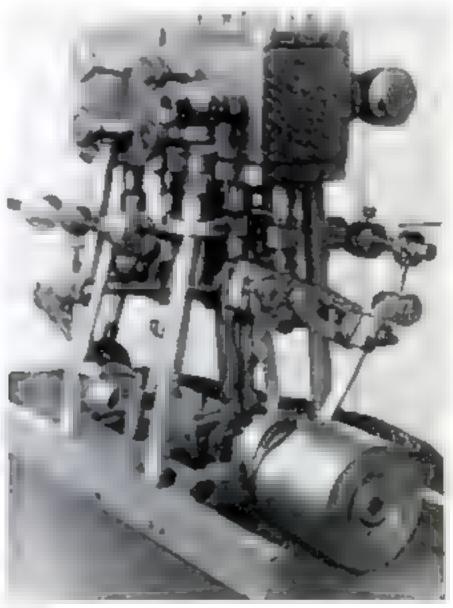


Sinmese Twin Onthoard. Two Akron, Ohio, men-Norman Lucky and Marvin Haas-converted a pair of droppable airplane fuel tanks to build this novel outboard runabout. After the tanks were cut

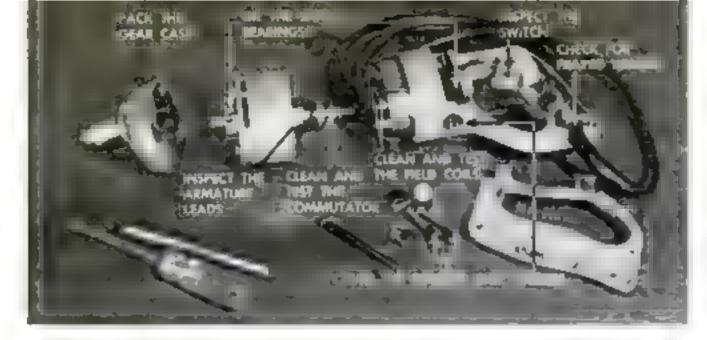
open and seats and upholstery installed, they were joined by a narrow deck that supports a 7%-hp. motor at the stern. Top speed is about 20 m.p.h. Cost of building the boat, exclusive of motor, was less than \$75.



Dolly Stores Boat on Side. To save storage space and facilitate handling of his boat in his workshop-garage, Tom Severs, of Moline, Ill., built this side-mount boat dolly. He used scrap lumber, four large casters, and discarded fire hose for padding. In building this type of dolly, care must be taken so the boat's center of gravity rests on the dolly's center. Otherwise, the boat would tend to topple off the dolly.



Engine Built with No Castings. This reversing, compound, marine steam engine, built by T. De Rosa, of South Vineland, N. J., measures 11" high and 12" long. No castings were used in its construction. It was built up of flat stock and rod stock and decorated with spot finishing. The engine has blow-off valves.



Most drills look like this when you get them apart, though the job of taking them apart will vary from one model to the next. Universal motors of this type are also generally used in vacuum cleaners, so new brushes and other replacement parts can often be found in vacuumcleaner shops.

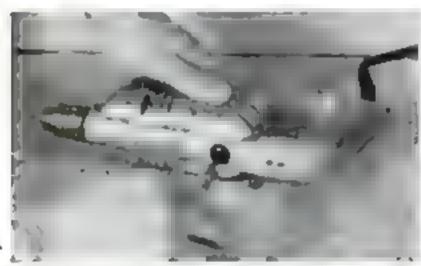
# How to Pep Up a Drill Motor

By J. W. Rocke

L'LECTRIC drills usually give a lot more L service than they get. If your drill has lost its pep, it may be that the motor is pulling its weight in dirt or running on dry bearings. If so, you can put it back in top condition with a brush and an oilean.

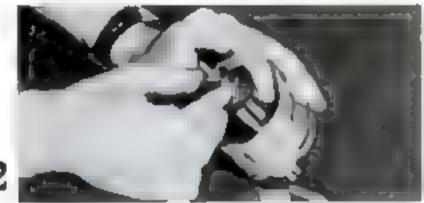
Or the trouble may run deeper. Defective armature and field coils can make a drill sluggish and unsafe to use. Coil rewinding is a tricky job, best left to specialists, but knowing when the job has to be done may minimize the damage and keep other parts from burning out.

What's wrong with your dull? These photos show what to check and how. The parts illustrated are standard for most drills.

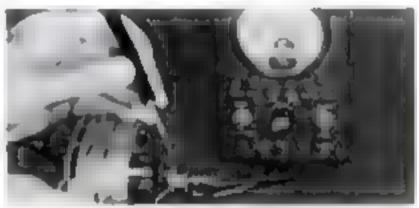


Remove motor brushes first. Unscrew the caps and lift the springs and brushes from their holders. Often you need go no farther to find trouble. Carbon brushes that are dirty, chipped, or excessively worn will cause arcing and loss of speed. They should be replaced.

To seat a new brush properly, wrap a strip of fine sandpaper (not emery cloth) around the commutator, grit side out. Fit the brush into its holder and rotate the armature by hand till the brush tip is shaped to match the curve of the commutator.



Clean the commutator and examine it for signs of roughness. Scored segments may cut down running speed. If the commutator looks okay, polish it with fine sandpaper. If it is out of round or badly pitted it will have to be trued up in a lathe. Mica separators will then have to be underent—trimmed back so they lie below the copper bars.



An ohmmeter will tell you whether the armature needs rewinding. Use it as shown above to measure resistance between any commutator segment and the one next to it. Then measure from the second segment to the third, from third to fourth, and so on around the circle. The meter reading should be uniform from pair to pair. If a reading is too low, a coil may be shorted, if too high, the winding may be open. Either defect can rob the motor of power.

If the winding is grounded to the armsture shaft, your drill is a shock hazard. To check this, touch one test prod to the shaft and the other to each commutator segment. If you get any reading, have the armature rewound. If you don't have an ohmmeter, make this test with a continuity checker. You can improvise one by wiring a bulb and a pair of test prods

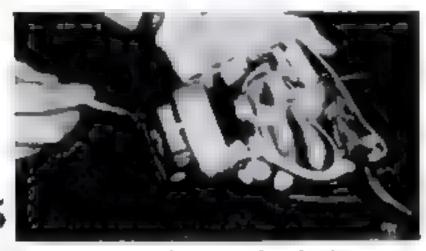
in series with the 115-volt line.

738 POPULAR SCIENCE

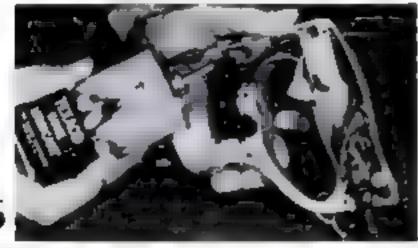


For safety, also test continuity between each side of the power cord and the case. There should be absolutely none. A "hot" drill handle conceivably could foll you. Examine the wires particularly at the point where they enter the handle. If they look frayed, cut away the damaged part or replace the whole cord.

Trace the wires that leave the field coils; one usually goes to a brush holder, the other to the power cord. Test between these points and the frame to make sure there are no grounds.



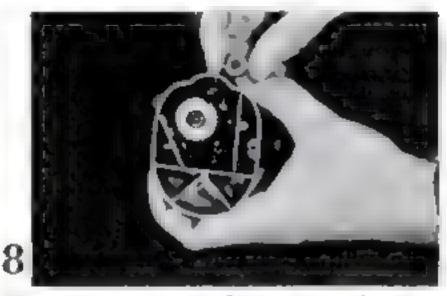
Visual checks can also give a lot of information, but to see properly you must first get rid of dust and grime. Brush and blow off as much dirt as possible, and clean the bearings, shafts, commutator, brushes, and coals with carbon tetrachloride. Examine all parts carefully for signs of scoring, pitting, excessive wear, burnt insulation, and the like.



Lubricate the bearings. A drop or two of light machine oil will help keep your drill running smoothly. Oil holes are often placed inside the castings so proper lubrication is only possible while the drill is disassembled. Don't use too much oil, for the excess may work onto the commutator and foul the brushes. If there are no oil holes the drill probably has sealed bearings that need no lubrication.



The gearbox can be lubricated with a mixture of graphite and light grease. Never pack the box solidly, for too much lubricant can create a power-robbing motor drag. Excess grease will also tend to leak out. Take careful note of the gear positions before removing them to pack the gearbox.

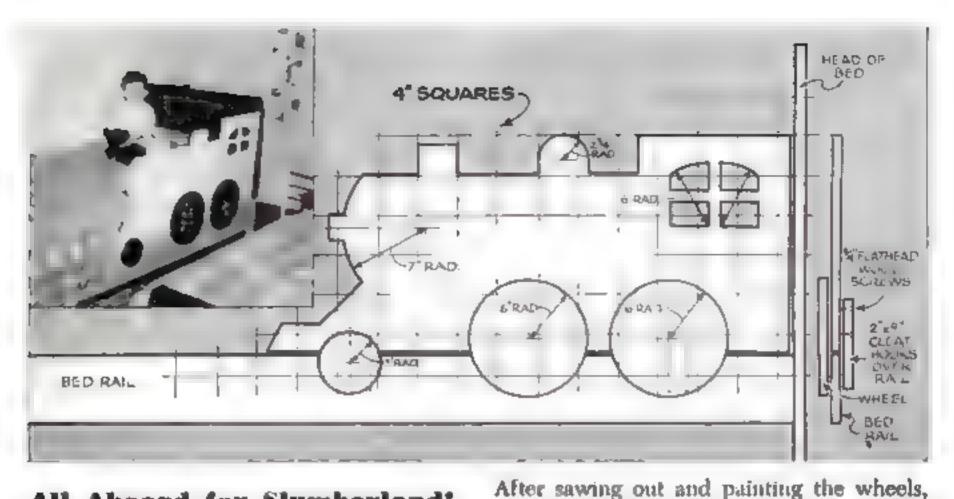


Thrust washers are used in most gear housings to prevent end-play between the gears. Worn washers will make the gears noisy. Chipped or broken gear teeth may cause premature wear of the gear train. Faulty parts should be replaced.



Reassemble the drill carefully. It should never be necessary to force any part into place. Tighten all screws evenly. Those shown join the two halves of the motor housing; if they are drawn up unequally, they may cause musalignment that will tend to bind the armature and gear shafts.

As a final precaution, repeat the continuity test by putting one prod across both prongs of the power plug and touching the other prod to the case. If you get any reading, the drill is unsafe.



### All Aboard for Slumberland:

With a sheet of %" plywood and a jigsaw, you can make it fun for Jumor to go to bed -as well as keep him from rolling out during the night.

Cut out the locomotive silhouette and butt the bottom edge on top of the bed rail.

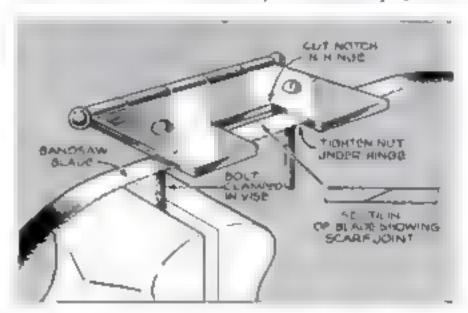
### Mard-Soldering Broken Saw

REPAIRING a broken bandsaw blade will save you money. I do the job with a special clamp, made by cutting a notch \" deep and 1" wide in a closed butt hinge.

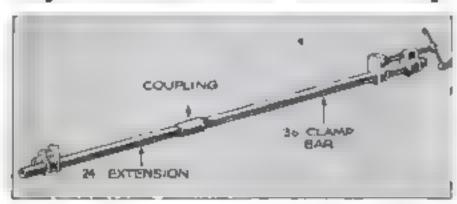
File the broken ends of the blade as shown. Clamp them close together in the hinge and grip one of the two clamping bolts in a vise. Put a little flux and a dab of silver solder on the joint and turn your torch on it.-W. V. Carter, Washington, D.C.

### tack them in place so they overlap the rail. A clamping cleat also goes on the back. This makes it easy to remove the locomotive when Junior outgrows it.

With this side on his bed, a child can graduate directly from a crib to a full-size bed-Robert V. Stewart, Cleveland, Olno



### Pipe Extends Reach of Clamp



When I set out to glue up a panel 55" wide, I found that the only available cabinet clamp had a maximum reach of 33". To extend it. I coupled a 24" piece of %" pipe to the 36" length on which the clamp jaws were originally mounted. That did it. The removable extension makes the clamp easy to store.-Wally Farnsworth, Los Angeles.

### Car Louvers Ventilate Wall

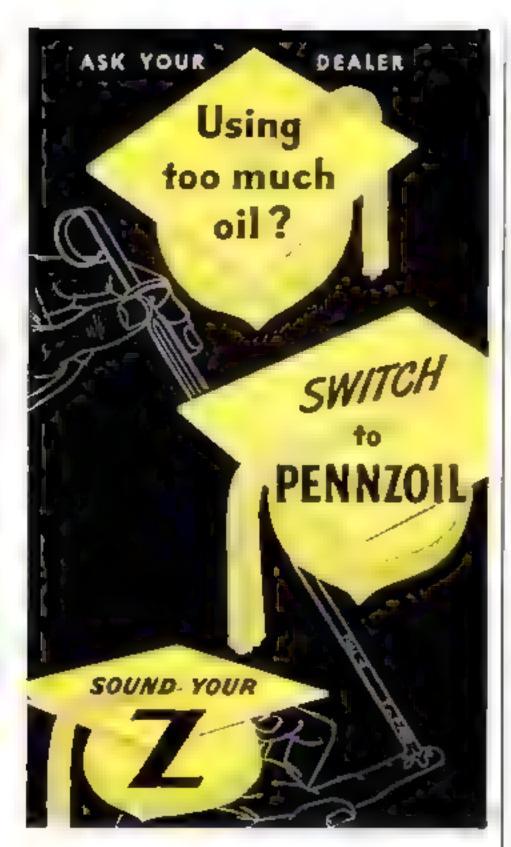
LOUVERED hoods from old-model cars in a junk yard can be used to make wall ventilators. The louvers below came from an old Nash.

With a solvent, clean the grease and dirt from the metal. Cut a piece of the louvered part of the hood to the size desired for the

ventilator. Mount it with small screws to the back of a mitered frame of 1" by 3" baseboard stock. Paint the frame and ventilator to match the wall and nail in place over the wall opening.







If you suspect you've been using too much oil, find out with your next oil change. Switch to Pennzoil, the 100% Pennsylvania motor oil that lasts longer, grade for grade.

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TOUGH-FILM PENNZOIL MOTOR OIL & LUBRICANTS AT BETTER DEALERS ... COAST TO COAST

# Mechanics of Farming



By Ladd Haystead

- Tractors powered with butane are sweeping the southern part of the na-Neither the oil companies nor the farm-equipment people are promoting the change, but farmers are making their own conversions for economy. As one Mississippi planter put it to this reporter, 'I save the labor cost per day of the driver by switching to butane. Besides cutting fuel bills, operators say, the tractors require less maintenance, partly because there is no dilution of lubricating oil by liquid fuel. (On butane-fueled trucks, cylinder walls show no wear even after 300,000 miles of operation.) However, the change is limited to areas close to the source of supply, because the cost of shipping butane cylinders long distances eats up the saving in operating costs.
- Airplanes seeded as much as 50,000 acres of pasture land apiece in a Government-sponsored project last year in the West. The planes drop pellets that contain, besides the seed, fertilizer, rodent repellants, and a growth starter. This year extensive areas of reforestation as well as range land will get the airplane treatment.
- The Atomic Energy Commission announces that 'farmers cannot expect increased yields from money invested in radioactive materials.' But at the same time, the AEC emphasizes that radioisotopes have made a great contribution to the understanding of how fertilizers react on plants. Sixteen agricultural experiment stations have obtained valuable results in the last year in radioactive phosphorous 'tracer' research.
- On the mineral-rich lands of the West, bumper crops could be produced if only there was water. In the past, this meant heavy Government expenditure for enormous dams. But recently, fresh interest has been generated in underground rivers and lakes, such as one now being devel-



# How long's that muck been in my con?

Too long, Mister, its engine-wrecking stuff—and if you want to duck some unpleasant repair bills...you need a new <u>Purolator</u> Refill for your oil <u>filter—quick!</u>

If you've been neglecting to have your oil filter checked, chances are there's horrible muck like this in your car. So when you change your oil this summer, start fresh with a new filter refill.

Be sure you get a Purolator Refill. Filters more completely, hence saves more substantially on repair bills. Costs only \$1.38 to \$3.00, depending on make of car. Inserted in a few minutes.



### Mechanics of Farming

oped in the Estancia Valley of New Here, there is no visible running water, but a young sheepman named Walter Mayer gambled there was a lake under the valley. He prospected for water -- not cil -- and hit. Now wells 60 to 300 feet deep provide 2,000 gallons per minute each -sufficient to irrigate 150 acres. The land, once worth only a few dollars an acre for grazing, is producing fabulous crops of as much as 4 tons of alfalfa per acre (usual average is % ton), and the land is being quoted at \$200 per acre. It is possible that lands in the more humid climates may also be sitting on lakes. If so, the droughts that have cut farm income may be offset by drilled wells to provide stand-by watering in dry years.

- Ties and poles discarded by the railroads each year amount to 3,000,000 tons of raw wood pulp, according to Dr. William M. Murray, Jr., director of Southern Research Institute, Birmingham, Ala. equals one-seventh of the total annual needs of the country's paper industry. Paper bags and wrapping paper made from the discarded material are somewhat weaker than those made from new wood, but further research may raise the strength to the level of new-wood paper. Dr. Murray also suggests that <u>sericea lespe-</u> deza, the widely popular forage plant of the South, may provide a source of pulp from the woody stalks left after the livestock feed is harvested. Experimental runs have already proved them useful in paper manufacture.
- Paper towels for cows is the newest wrinkle in bovine sanitation. Instead of says Cornell University. washing and cleaning a cow's udder with a cloth towel, which might carry infection from one cow to another, paper towels are used and then thrown away. The claim that this method will materially reduce the \$600,000,000 yearly loss from mastitis is greeted with some reserve by veterinarians, who point out that mastitis seems to be caused by traumatic injury, cold stalls. eto., as well as by transference of infaction.





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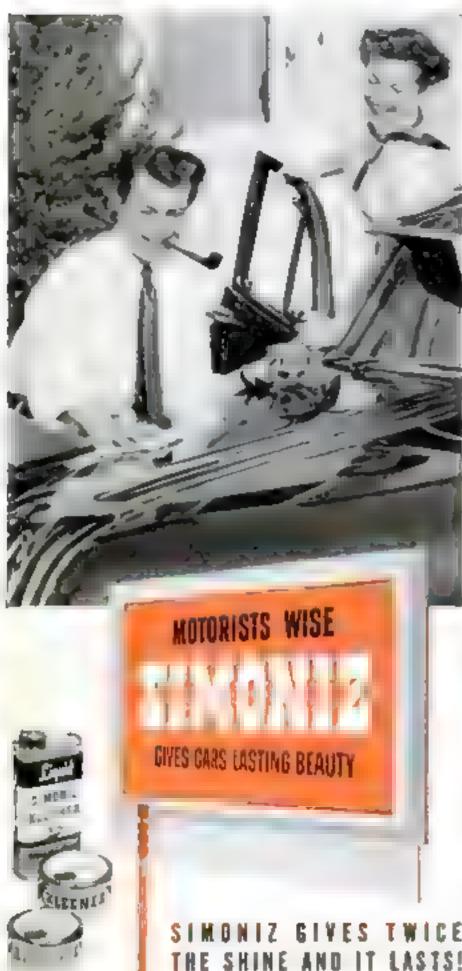
# Where else can you find such opportunities as you're offered in the new Airman Career Program!

As an Airman you're on your way to a real career. Scientific aptitude tests reveal your strongest abilities. Then you are expertly trained, either on the job or in the world's finest technical schools, for one of the 400 job specialties in the many Airmen career fields—with full pay from the start. You have many opportunities for education, advancement, security, and the good things of life. Inquire about the Airman Career Program at your nearest Recruiting Station.



# WHY WASTE TIME

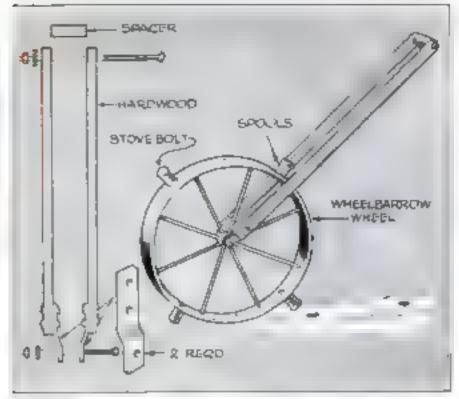
with "temporary polishes?"



THE SHINE AND IT LASTS!

Long losting Simoniz saves time and effort really protects and preserves the finish keeps colors from fading! Your car will stay brighter than new with Simonizing-the Deluxe Beauty Treatment.

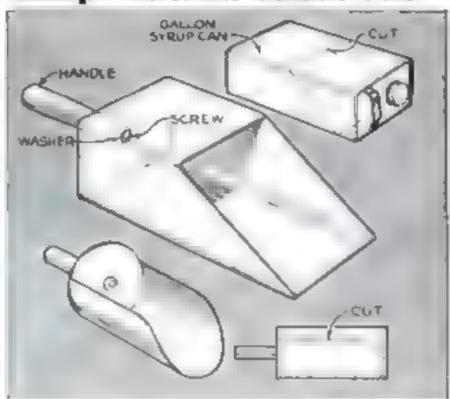
THE SIMONEZ COMPANY, CHICAGO IS, ILL.



### Old Wheel Spaces Plants

THE wheel from an old wheelbarrow and odds and ends of scrap will make a plant spacer for your garden. Drill holes in the wheel at about 6" intervals. Then you can adjust the spools for various intervals between plants.-V. H. Lamoy, Upper Jay, N.Y.

### Scoop Cut from Gallon Can



FARMERS and storekeepers will find this scoop handy for grain, flour, and feed. Cut a gallon syrup can as shown and put a wood handle on it. A washer keeps the screw head from pulling through the metal. A round can may also be used.

### Aluminum Keeps a Cool Head

If you have to be out for a long time in the hot sun, you can protect your head from some of the effects of the rays by lining your hat with aluminum foil. Slip the edges of the foil under the sweatband to prevent actual contact with hair or skin -P. A. Dalal, Bombay, India.

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# You're driving into the an er Loue

### WARNING ZONE

Engine loses per . . .

### DANGER ZONE

Engine begins to smoke . . .

### BANBER ZONE ?

Engine pumps ell badly . . .

### DANGER ZONE 3

Destructive wear sats in . .













### Reeds a tame-up

Clean, adjust and re-time Ignition. Clean fuel supply and carburetor screens Adjust carburator, Adjust teppets and fan belt. Check compression and vacuum readings for symptoms of ring wear,

Replace piston rings. Align rods. Adjust rods or replace rod bearings, Reseat and MARKET MARKET.

Tune engine.

These repairs are comparatively inexpensive and put the engine back in peak condition for thousands of aconomical miles. Delay puts the engine in Danger

### Needs new piston rings and major engine repairs

Replace piston rings, Repiace piston pins. Adjustprobably replace—main bearings. Augn rods. Adjust rods or replace rod bearings. Reseat and reface valves. Tune engine.

These repairs naturally cost more than those needed in Danger Zone 1, but they out the engine back in condition for thousends of additional miles of satisfactory service. Delay leads to costly Danger Zone 3.

### **Noods now pisten rings** and complete everhaul

Repairs cost three or four timas as much as in Danger Zone 1.

Remove angine, Rebore cylinders. Regiace pistons, pins, rings. Repisce main bearings, Align rods, refit or replace rods, or replace red bearings. Overheul valve litters, rocker arms. Replace timing chains or gears. Resent, reface valves. Replace guides and springs. Replace camshaft bearings, Clean oil lines. Overheul or pump.

Clean, re-install and tune

### Piston rings should be replaced ... at the first sign of wear!

You'll be money ahead if you replace your piston rings when your car first gets into the Danger Zone. But if you delay until the second or third Danger Zone, repairs cost two to four times as much.

The more you delay-the more you pay !

In any Danger Zone, ask your motor service man

for Hastings Piston Rings. They stop oil-pumping, check cylinder wear and restore performance.

It's the best money you can spend on your car.

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### Vacuum-Grip Bulb Changer



CHANGING ceiling electric-light bulbs is a simple task with this device that clasps the bulb in a vacuum-opcrated rubber holder. A single stroke of the pull-out rod at the handle end, as shown at left, works a built-in vacuum pump. Since no pressure is exerted against the bulb as in mechanical grippers it is claimed that breakage is eliminated. Made by the Lumidor Mfg. Co., of Los Angeles, the gadget will handle all bulbs from 15 to 1,500 watts.



### Machine Vends Fresh Fruit

A conv dropped into the slot of the Fruit-O-Matic, shown being loaded above, brings you a choice of four kinds of fruit chilled to perfect eating temperature. The refrigerated vendor has a capacity of 208 pieces of fruit held in small steel wire baskets that rotate on endless metal bands. The machine is made by the Fruit-O-Matic Manufacturing Co., of Los Angeles, Calif.



### Small Fry Thirst Quencher

No NEED to boost Junior Miss or her kid brother to reach this "small fiv" drinking fountain made by Westinghouse. Mounted halfway down the side of a standard water cooler, the child's bubbler may be finger operated at the same time mother is having her fill at the upstairs fountain.



### Sandbox Is Also Wading Pool

MADE from a single sheet of heavy gauge steel, this sandbox is strong enough to support several children. The playbox measures 40 by 45 inches, and can be assembled in a few minutes without tools. Filled with water, it doubles as a wading pool. Sturdy one-inch plank seats fit along two sides. Made by the American Metal Specialties Corp., of Hatboro, Pa., the Sand-E-Wade comes with a colored vinyl-fabric canopy.



NOT FOR A

# MONTAMOWER Mows and Trims LAVINS

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I wouldn't trade my Moura-Mower for a dozen ordinary fawn mowers?"

The above statement is a direct quotation from one of thousands of unsolicited sestimonal letters received from MontaMower owners every year

And little wonder MontaMower owners are so enthusiastic! MontaMower represents the first basic advancement in lawn mowing devices during the past half century. It is a new and different kind of lawn mower that mow and trims in one easy operation.

Actually, the Montahfower is a live, 614 lb, precision machine that smoothly and quietly cuts a full 16" swath through grass, dandellous, spike grass and tall laws weeds (including the ones that ordinarity pop-back-up to cause you extra work).

AND WHAT'S MORE — MonuMover does what no conventional mover can do! It cuts right up to walls, fences, trees and posts — practically eliminates hand tristming. It cuts under foliage, around flower gardens and close-quarter borders which cannot be moved successfully with conventional hand or power movers.

The MontaMower is so light, so sturdy and responsive, that even women and children can operate it easily and efficiently. Owners tell us that with their new MontaMowers they gut their lawns in half the time — with less than half the effort.

Learn their facts about the MontaMower from actual experience....it's sold under a liberal "Written Guarantee" which permits you to try it on your own laws....makes you the sole judge of its merits. Get the complete facts about the moderately priced MontaMower, AT ONCE! Just fill out the coupen below and mail it today.

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buildings, from



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MONTAMOWER DISTRIBUTING CO.

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Condence: Without obligation, kindly send me complete descriptive interature, price, guarantee information, and full details of Approval Offer.

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ADDRESS

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FACTORIES. TRAVERSE CITY, MICHIGAN

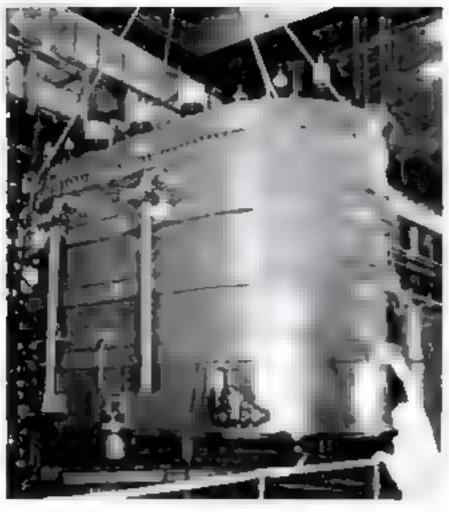
The new improved MontaMower has eight pairs of sharp-edged, precision made and fissed, tool-steel cutting disks, slightly overlapping and self-sharpening working as a unit. Each pair revolving toward each other gathers the grass and cuts it cleanly at the intersection of the disks. The new improved model is easily and quickly adjustable to cutting height! It's as modern and efficient as an electric rator!

The MonteNewer is said only by direct mult to years [no agents or dealers . . . no foreign sales at present.]

TRY IT ON YOUR OWN LAWN!

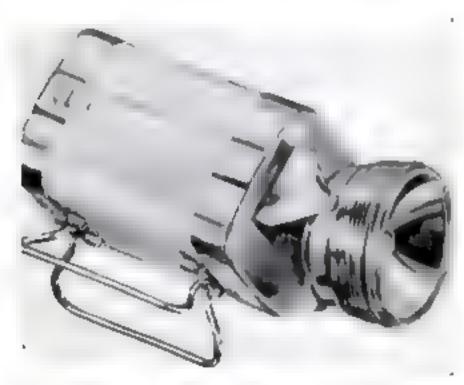


Buy Spares ... they stay fresh



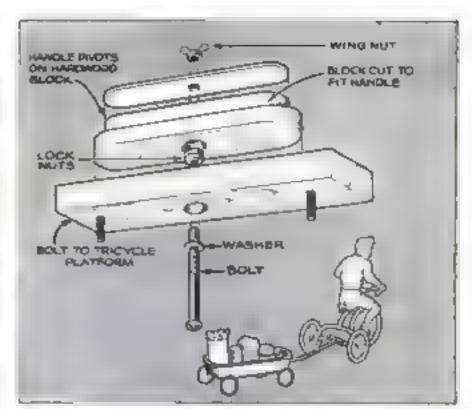
### Transformer Takes Big Load

THE 150-ton transformer shown above being lifted out of a General Electric test pit will handle enough electric power to supply a city of 150,000 people. Rated at 145 million watts, it ruses 15,000 volts to the 135,000 volts needed to power Detroit Edison transmission lines. Big as it is, the huge transformer is 25 percent less bulky than previous models with this rating.



### Flashlight Has Double Power

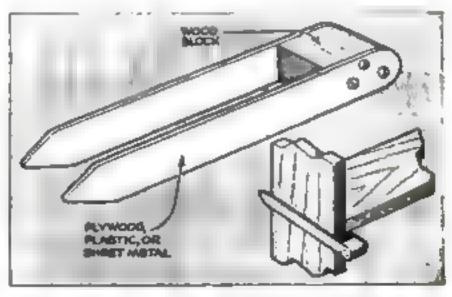
WITH eight standard flashlight batteries in its compact case, the Yellow-Flash light shown above claims twice the power of an ordinary camp or fishing lantern. Less than 8 inches long and only 3% inches square, the light fits easily in a glove compartment or tackle box. The Justrate Mfg. Co., of Chicago, makes it to sell for about \$4.



### Hitch a Wagon to a Tricycle

Your youngster will get a kick out of this simple trailer hitch with which he can tow a wagon behind his tricycle. For neat appearance and accurate control, it's miles uhead of a messy, tangled towrope.

Carve a hardwood block to fit the wagon handle and leave a supporting flange on the bottom. If it's easier, make the two steps separately and fasten the pieces together. The turning block is pivoted to a base as shown. If the platform of the tricycle is smooth and flat, the base can be omitted. The clamp plate, cut from his strap iron, swivels at right angles to the block to hold on the wagon handle. The wing nut clamps it fast.—Charles H. Hardy, Los Angeles.



### **Parallel Tool Guides Assembly**

Hene's a homemade tool that helps a lot in such assembly operations as locating screws or nails for bookshelves. Make the blades of any material that won't warp or bend out of shape. In attaching the blades to the wood divider, be careful to get them parallel and their edges even so you can transfer measurements around a board.—Stinson Scram, Brantford, Ont.





IF YOUR CAR-LIGHTER'S LOST OR BROKEN, REPLACE IT WITH THE ORIGINAL

### POP-OUT CIGARETTE LIGHTER

Replace your last or broken per lighter with a new Chrome-plated "Pop-Out", hast because it's original equipment in 9 out of 10 curs, Automatically pops out in 10 seconds with an even glow. Set Casco Accessories at Car Boolers, Auto Supply Stores, Service Stations.



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EASY WAY to fill cracks and holes in wood, plaster and other materials. SAVOGRAN CRACK FILLER dries hard as stone. SAVOGRAN WOOD PUTTY contains real wood — is easily tooled. Both are quick-hardening, non-shrinking — take paint beautifully. Repair furniture, floors, woodwork, tile, knobs — 1001 uses! Big 1-lb. can ONLY 35¢ where you buy paints.

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# Drive <u>anywhere</u> this summer

### AND NEVER HAVE A FLAT TIRE!



Fishing haunts back in the woods . . . picnic spots off the main road unexpected puncture-full detours . . . and never worsy for a second about having a flat tire!

Run right over rever-sharp glass! The punctures will be sealed as you ride, with Seiberling SEALED-AIR Tubes (completely different from any other tubes in the world!)

# NO ONE CAN IMITATE THE WAY THIS TUBE SEALS PUNCTURES!

Exclusive design principle . . . perfected, proved, and patented by Seiberling . . . makes SEALED-AIR Tubes different from all others in the world . . . gives you more protection against troublesome flats and dangerous blowouts.

Outlasts set after set of tires. Think of the savings! And you won't have to spend a nickel on tire repairs, either. If you drive a car or truck, mail the coupon below for complete details on this amazing tube . . . and what it can do for you.

Mail the Coupon NOW!



Pick up nuits ... not just one nuil, but a dozen or a hundred ... and what happens? NOTHING, when Seiberling patented SFALED-AIR Tubes are inside your tires.

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WITH PATENTED BULKHEADS

AND NOT ONE FLAT Learn how the only tube built around patented Bulkheading principle can save you money ... AND TROUBLE. No obligation. Simply mail this coupon now (before YOU have a flat') to Seiberling Rubber Co., Dept. P5-3, Akron 9, Ohio.

Name.

Address

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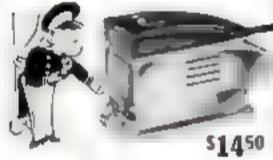


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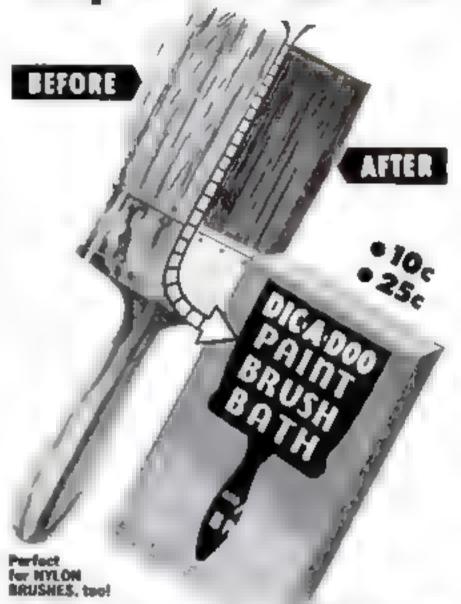




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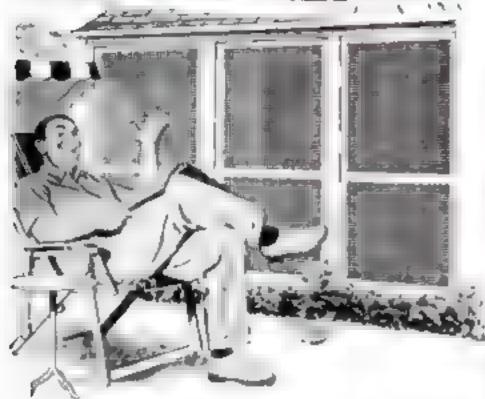
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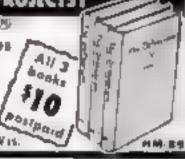
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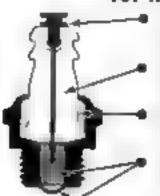


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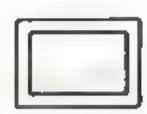
2. A round sign indicates a MAILBOAD cansenc and warns you to approach it with caution.



A diamond shaped sign tells you to slow DOWN -- indicating a dangerous curve, hall, or augular hazard.



4. A square sign normally indicates SCHOOL ZONE or other areas involving hazards to pedestrians.



5. A rectangular aign gives TRAPPIC DIREC-TIONS - Keep To Right, No Left Turn, No Parking, etc.



On a dark, rainy night like this, the shape of the nigh ahead tells this driver that a railroad crossing lies shead. It alorts him in time and warns him to approach it with coulon.

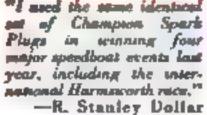


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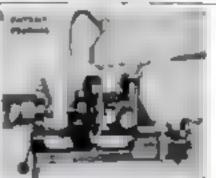
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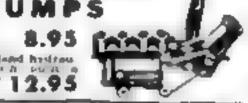
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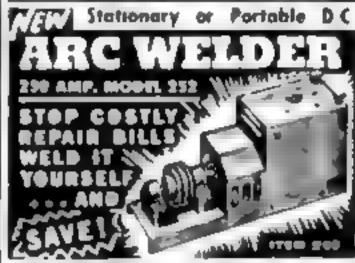
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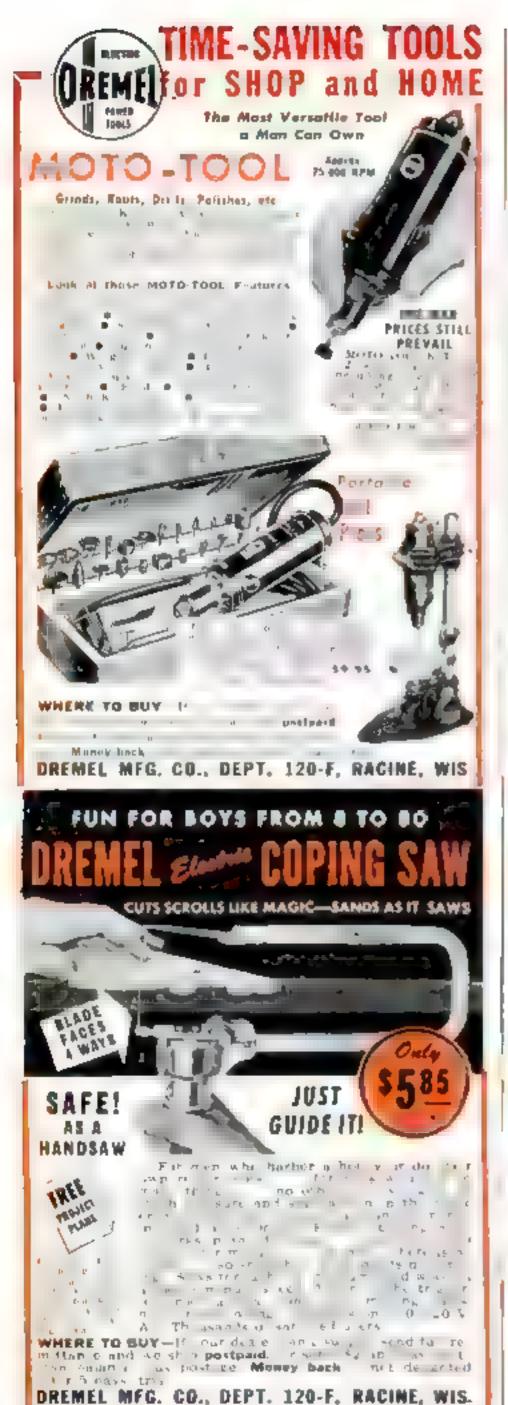
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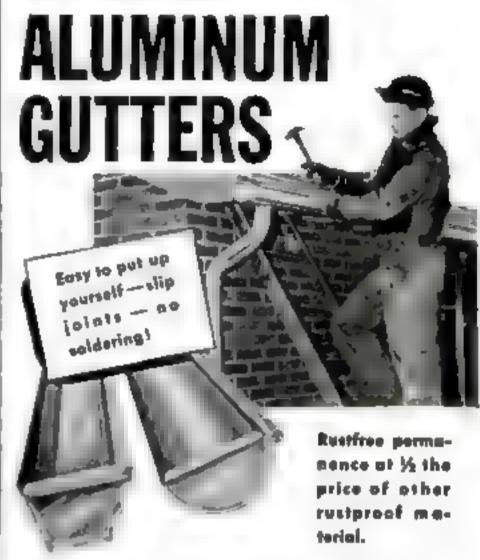


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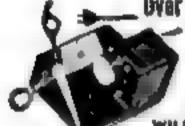
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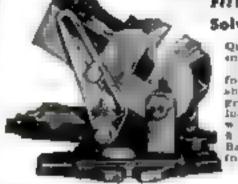


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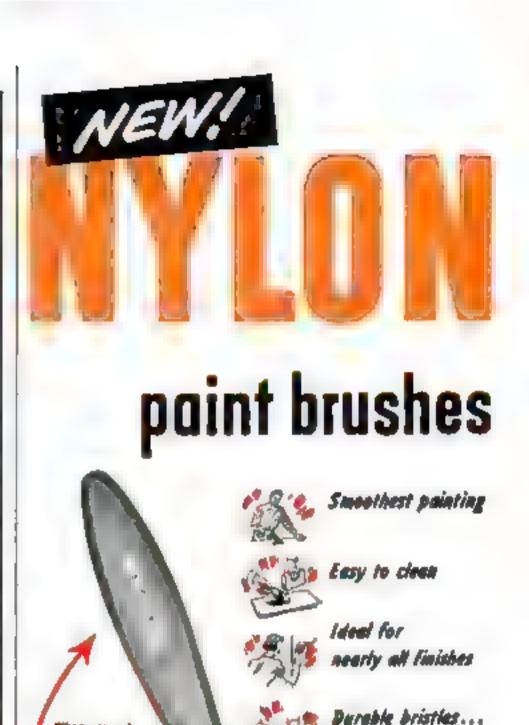
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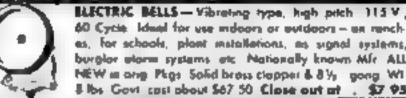
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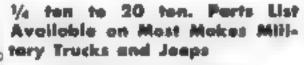
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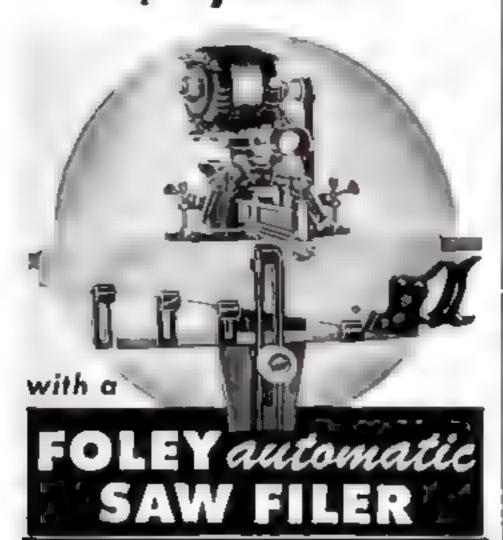
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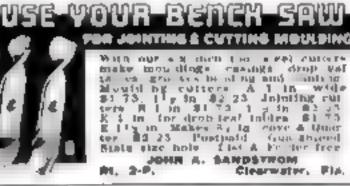
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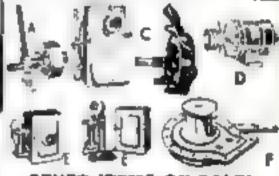




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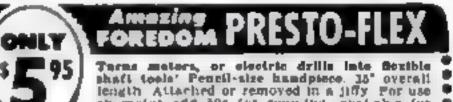


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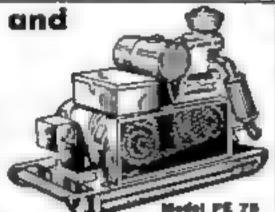
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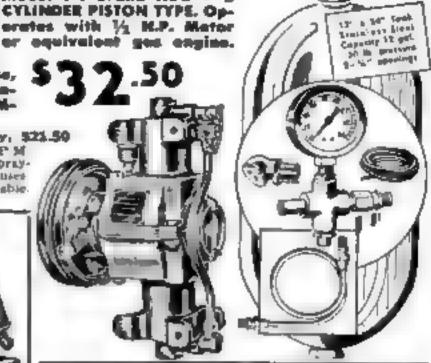
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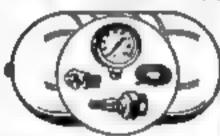
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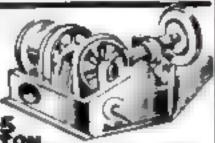
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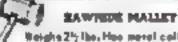
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NEW MYDRANLIC CYLINDER SPECIAL

20,000 4 Street Lough F- warmp 1500 PSI I'm pressure as already from our

high proper Or well produce 40,000 ft. House much 2 000 No. has presture. CAN ALSO BE OPERATED ON LOW PARS. SLIPE AND SYSTEMS, 4" Bure, 15" dec. proteer short, "H" skade, fampik 30%" Empared with helf bearing feeded claves type counting and surveil type high presfor read, for 6 shop regionary 2250

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4 - WAY TALVE

Popper Type, Value whole off at much position Has 3.97 AC Tobs Ports 9 & 20 Herad, 9-11 475

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Provides on instructionings source of from ideas greek for player my navey work Double betrem anner De vers 30 qu. ot. pin cycle of 2000 PS1 free press 5000 PS1 Bullion Res street top. 24 ats. 3 T. pige sub-La v. Hits Pressure Rations Value 5 die. by 2, 3 to seem to 137 ht 4 ... 4545

Used in Good Condition. 11.95

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Rust recisions alleged steel, entre flee this professorie 7 s. 9 smood-annual sa-3ch, 1 4" . 4ch 9 32" 44ch 1/8" 1.16 Se h. 120 Se h 27y 40 5 777 - Se in 1/7" Se in de fe, 1 d" Brause 144 9 3 14" t W' Srambon Stood ... the par ft. I der beneinen bem albig per fra

Avends come cobia 18 h, lung,

# 15 H. Same. TWO MEAT SOLDERING IRON Parking Harry of

These are the very peaulier "grice" feverite. Mode aim for in avery destril to the genuine AAF Glasses but have a 4 haze, processed gives tone. Freezes me Gold Planed and have Pearliped aware her and nosu pada. Cobie per pieces ore educati able Complete with a And Courter Same :

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> Boat Fender 21" tong, 5" die Gop you has the prorugged have & marcia funders A MASO Value Only 795

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ratio, america, etc.) . . \$112 . . \$3.95 FG (1 10-1 pour retre

GEAR BOXES 970-1 - 60"
| Charel pow 75; to I coduction, sere 7" + 6" A Lebr \$3 95 t fo-b - hel no sour goor life to 1 sour tion, thrud goes Final take-old 4% die. 26 teath. If Alum spot goor. 95.40 Britt above good boxes have level control for a specific to transmission provides on the first transmission from 8.8 m 700 to with their Treatment and the

ELECTROMIC THANSAU SSION SEAR TRAIN GT-1 Containing

opperer, 50 Brungs

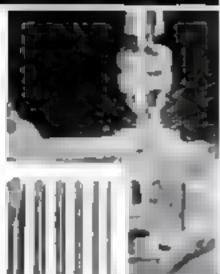
me) 54 ur & Procum Compani company from 3 ET to 4" dia., 5 sets of 7 cluster gows, 2 complata warm fi. warm gam dreu nath, 48 M.D. half how-regs from \$5' to 15' dos. match agrings, husbrigs, poers, focu-plates, housings — Micro Sulfabos, 2 numbers, prompted a latebox, etc. 19ths.

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# DRILL" HARDEST: STEEL"

# FIRTHITE Sintered Carbide

You can drill holes in Hent-Treated steels (up to RWC-66) with on ordinary drill



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Please send 🗆 Firthite Orll Kit.

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## GIL-BILT 10-INCH TA LTING ARBOR SAW

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# GIL-BILT 12-INCH BAND SAW

- this precior of 54 Betterele Hard as stork up to 6 bett their 185 8 no 5 store title 45 degrees Invoce whee his drive pully tune on sected New Departure But Ocal tigs it pper wheel make on two
- - 1 page 2 o fit offer bearings
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- Hubbert I red whrels Choice of cast also the hum or make your own wood wheels on the large atgrated '8 inch blades up to % inch wide.

   Fully entered has but one for utspost safety that Bill 7 a cast that a tracked a P and rubber tires in h b ade but of wood wheels. Ball boar of an me of the large on guides, table till segments and all other me of parts.

Same Kit with two machined ready to tostall 12" cast alumnum 520.75

Return K to an I days for refund if not saltated (I'v on tectude to the with a 600 of the Over 500 of the Sell Also available—Plans and Parts Kit for 6: Titt Table saw. Order Plans at \$1.00 each stent postpaid anywhere in the world to write for FREE descriptive calalog.

GILLIOM POWER TOOLS P. O. Box 1-VF. Lambert Field



Level Fits on Drill. A level on an electric drill was suggested by John L. Mc-Clung, of Port Huron, Mich., in "I'd Like to See Them Make," PS, Dec., '49 Now you can buy such a level from the Singer Kennedy Corp., Chicago, for about \$5 This level is attached by two small machine screws. It can be adjusted to any angle from 0° to 90°. After setting the level to the desired angle, the operator watches the bubble-not the drill-keeping it centered in the glass to drill a hole at the correct angle.

Drives Screws Automatically. Screwsticks, a development of the Ameri can Screw Co., Providence, R. I., are used in this rotary pneumatic tool made by the Independent Pneumatic Tool Co., Aurora, Ill.



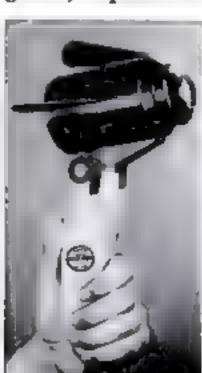
Screwsticks are a series of hex-head screws joined head end to thread end. The tool feeds and drives screws as fast as the operator can move from hole to hole in the work. When the tool drives a screw home, it is automatically twisted off.

# Tools



Precision Screwdriver Set. Five interchangeable blades ranging in width from .100" to .040" and a nickel-plated, knurled handle are included in this set of jeweler's screwdrivers. The top of the handle swivels for convenience in running fine screws. A chuck holds the blades in the handle. Blades and handle are stored in an aluminum base. The Shadow Box, Brooklyn, N. Y., prices the set at \$1.50.

Heat Gun Burns Off Paint. This flameless heat gun, made by Kinetic Laboratories, Philadelphia, quickly reduces old paint to a flaky ash that can easily be scraped off. It leaves the surface clean, without gummy deposits. It also can be used to heat



plastics for bending. The unit, drawing 400 watts at 115 volts AC. consists of an electric resistance embedded in ceramic. A steel container encases the unit. Including the wooden handle, the gun weighs about 2 lb. The gun projects about 1,200° of heat and may be used for the same purposes as a gasoline blowtorch, except for brazing.

# AMAZING NEW



Bight angle drive 2 speed unit
Ficable melded rubber head
Direct drive adaptor, cup washer, screw
Potishing busnet highest grade lambs weel
Heavy-olfe carpet compound rubbing and
Three sanding disco—coarse, medium, fine grick
Full directions

Full money back guarantes. Sent postpald anywhere in U. S.

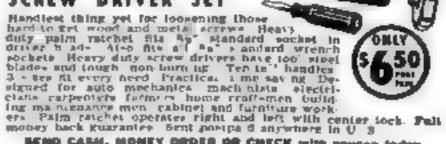


# DIRECT DRIVE Polishing and Sanding Kit

Designed for use with any electric drill. Kit conve. no itubber head with cup waster screw and adapter highest grade genuine sambs and polishing bonnel, medium grit sanding die idea, for use with churk and drill bench subunitage and for %" electric drills. Operates at iftel speed, Full money back granules, Fest postpaid anywhere in U. S.

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# For Dad on Father's Day

with these 3 tools you can

join squeeze

grip turn straighten hold twist fasten tighten push DUIL loosen bend cut anything in and

around the house MagneKit includes

6" Long Chule Nosa Pilars "Adjustable Wrench 7" Angle Note Pliers PLUS Magnelic Tool Holder, all for price \$5.85 of tools, alone

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Here's a gift Dad will prize! The 3 basic tools the hebbyist or handyman uses constantly in construction and repair work—PLUS a powerful, permanent Magnetic Helder, "Prefessional" tools, these, that eneble enyone, novice or expert, to do the job easier, quicker, better. Your hardware store has the handy, new MagneKit or can get it for you.

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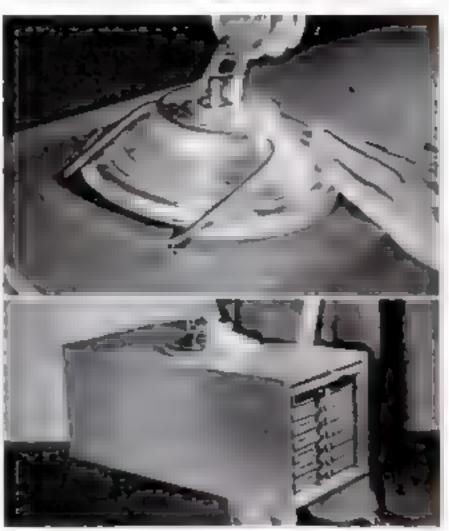
It pays quality tools



PEEL PAINT TO BARE WITH ONE EASY STROKE

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# X New Tools

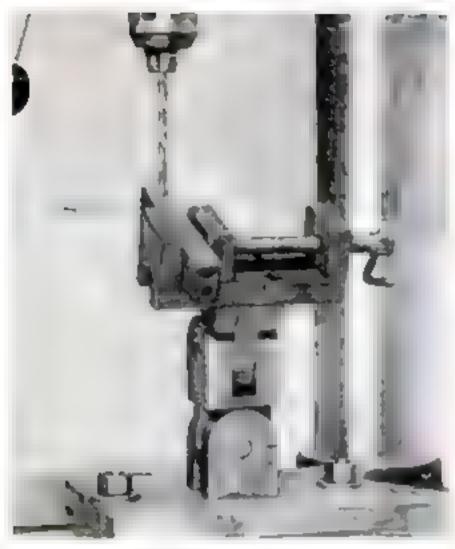


Giant Suction Cup. Heavy, bulky objects-if they have a smooth, flat surfacecan be moved easily with this jumbo suction cup. Its manufacturer, the A-C Suction Cup, Brooklyn, N.Y., makes no specific claims as to the amount of weight the cup will handle, since surfaces vary greatly. However, it has proved successful in moving furniture and large sheets of plate glass.

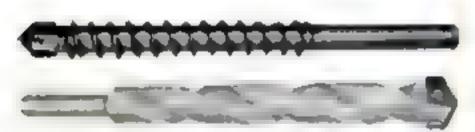
To attach the cup, the control lever is pushed down. This brings up a metal disk in the center of the rubber disk, creating a strong suction that is sealed by the rubber around the edges.



Calking Gun Has Plier Grip. This gun is said by the maker-Western Reserve Manufacturing Co., Cleveland-to cut calking time as much as 30 percent. The gun is operated by a squeezing action of your hand-the same as you'd use with a pair of pliers. Either cartridge or bulk compounds can be used in the gun. Changeover from bulk to cartridges requires only the removal of two leather washers. Interchangeable nozzles for various jobs are available. The gun comes in three sizes: 15-, 30-, and 45-cu. in. capacity.



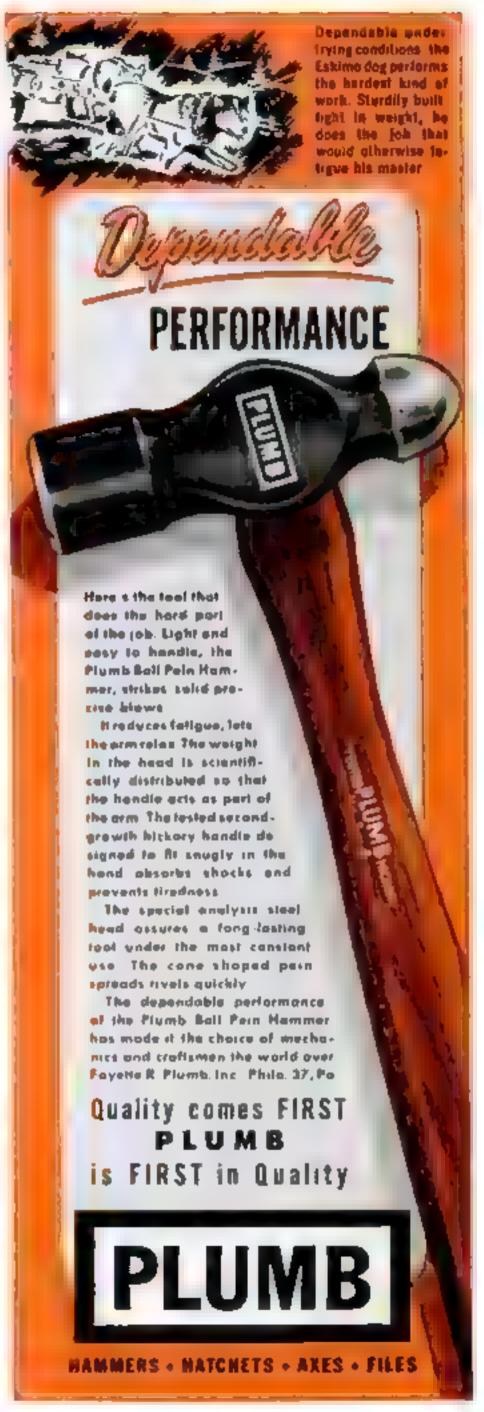
Compound Angle Vise. This vise, made by En Fab, Inc., of Kalamazoo, Mich., holds work at compound angles for grinding, milling, or drilling. The price is about \$25. By removing four recessed-head screws, the swivel vise can be converted to a straight drill vise. The vise will hold work up to 1½" by 2½". Size of the slotted base is 4" by 6". Over-all height is 6". The unit swings 180° in either direction. Original setups may be made by the index marks, but for greater accuracy, a surface gauge is suggested.



Two New Masonry Drills. Both of these drils—made in standard sizes—speed up masonry drilling by carrying the dust out of the hole as they drill.

The drill in the upper photo is made by Carboloy Co., Inc., Detroit. High-tensile strength wire, swaged to the shank at upper and lower ends, is wound around the shank. Dust cut loose by the tip is lifted up and out of the hole by the wire spiral.

The other photo shows a drill made by Kennametal Inc., Latrobe, Pa. It has an angled cutting point of cemented carbide that the maker claims gives the drill greater biting power. The spiral cleans the dust out of the hole.



# Last minute news & notes...

AUTO FIGURES: The U. S. now has 35,-000.000 cars. Los Angeles County alone has more than the whole of Asia. Two out of every five cars now on the road are 10 or more years old. Since 1925, the average lifetime of a car has nearly doubled. Life expectancy of those now being made is 12 years. There've been 1.850 American makes of autos. but only 20 are still being produced. Last year 5,000,000 passenger cars were made in the U. S .-- enough to fill 16 traffic lanes from Boston to Los Angeles.

CANCER DETECTION will be easier through a new technique devised by four scientists of the University of California at Los Angeles. work must be done, however, before it is available for general use.

COLORADO SHEEPHERDERS' children never use the hundreds of rubber wading pools now being sold to Western ranchers. Instead of the heavy galvanized iron tanks once used for dipping and watering sheep, the new neoprene, portable, collapsible wading pools fill the bill exactly.

ENGINE PROGRESS: Combinations of metals and ceramics (called Metamics) are being tried to withstand the high temperatures in jet engines . . . Magnetic-fluid clutches in which cylinders are used in place of disks are being tested in General Electric's labs . . . Better self-starters for gas-turbine planes have been made possible by the development of a new auxiliary power system.

WHEN THINKING MACHINES of the future make a mistake, they'll know it and automatically correct it. A Bell Telephone Laboratories mathematician has figured out a way to build a conscience into computers that will give them this superhuman ability.

SAFETY SCHEMES: A traffic light that talks is being tried out in Syra-

cuse, N. Y. It reminds pedestrians. 'Look right, look left; it may save your life. . . . Coal mining is being made safer by bolting layers of rock together like plywood. This makes the mine roofing self-supporting . . . Shooting galleries can be made safer now, too -- by using newly developed cartridges that pulverize rather than spatter.

ATOMIC NEWS: Construction of a nuclear reactor to yield power for peacetime purposes at West Milton. N. Y., has been postponed. Instead. GE scientists who've been planning that project have been directed by the AEC to concentrate on developing an atomic engine for ships--the second one now in the works . . . Another gigantic atom-smasher is scheduled to be built near San Fran-Cisco for secret work.

A RAPID-REVERSING MOTOR developed by the National Bureau of Standards can change direction of rotation 20 times while you're winking an eye. It has been easy to stop a motor quickly with a brake: the hitch was to rev it up to full speed quickly the other way. In NBS's invention. kinetic energy of the rotor, instead of being dissipated as heat in a brake, is used to twist a springsteel red that then flips the reter capidly in the opposite direction. The new motor is expected to be useful in electronic computers. instruments, and industrial machinery.

PLASTIC PADS are being produced now to go between railroad ties and the steel tie plates. Tests have shown that they prolong the life of the wooden ties . . . VACUUM TUBES put in the 'bulges' (amplifiers) of a telephone cable that is being laid between Florida and Cuba are expected to last 25 years . . . MOUSE TRAPS that work like flypaper (the feet of the mouse stick to 'em' are being sold now by Electronic Rat Traps, Inc., Rochester, N. Y.

The Editors

This One

BJHU-J78-W10L



WHEN YOUR PATCHING
TURNS OUT LIKE THIS... ON ...IT'S TIME FOR MARFAK
IT'S TIME FOR A NEW TUBE... CHASSIS LUBRICATION



THAT CUSHIONY FEELING LASTS LONGER WITH MARFAK!

Marfak is extra tough and stretchy—specially compounded to cling to bearings and vital wear points. That's why Marfak protects the chassis—not for a few hundred miles but for 1,000 miles and more! Enjoy that swell "cushiony" driving ease that lasts. Applied by chart, never by chance. Get Marfak lubrication today at your Texaco Dealer, the best friend your car ever bad.





# THE TEXAS COMPANY

TEXACO DEALERS IN ALL 48 STATES

Texaco Products are also distributed in Canada

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Only Presto Has ALL These Features

Ends Fire as Fast as 3 Seconds

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Weighs Less Than 1 lb.

Easily Held in One Hand-Even by a Child

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Costs Only \$3.98-Yet Out-Performs Bolky Extinguishers Costing Several Times As Much

Automatic Pressure—No Pumping

Guaranteed for 20 Years—Cerlificate Packed with Every Presto

This is the average earning reported by Pre WILLIAM F. WYDALLIS. "The sky's the lim profits because of America's serious need for extinguishing discovery.

TOULDN'T YOU like to be making the kind of money William F. Wydallis is making? His story (printed at right) is just one example of the brilliant success that Presto salesmen are meeting everywhere!

A Florida salesman earned \$600 in one month. An Ohio man earned \$2100 in two months. A New York salesman earned \$1500 in one month. A New Hampshire salesman added the Presto as a sideline and picked up an extra \$1800 in 20 months.



Help Save Your Town's Homes fo pan bursts into flame . . . a minutes the entire house is the flames like there fast as 2 secrepresentatives are welcome of

# WHAT IS THE

PRESTO contains an amazing new chemical — "Chlorobromomethane" C.B." The Germans developed "C.B." as a secret defense against fire during the war. After the war, a famous American firm, The Dow Chemical Company, acquired the formula from the U.S. Government and began manufacturing it here. Then we (Merlite Industries) designed a bandy-yet amazingly effective-fire extinguisher to contain and release this new wonder-chemical.

Dow's Findings on "C.8."

In comparing the effectiveness of "C.B." in fighting various kinds of fires The Dow Chemical Company's report states: "It has been proved that 'C.B.' is about 1.5 to 6 times as effective as other common extinguishing agents on an equal weight basis,"

This extra effectiveness of "C.B," means that Presto can be made light and handy enough for even a woman or child to use. No pumping-no heavy tank or tangled tubes to struggle with, Just a twist of the knob . . . and flames disappear! "Sells on sight" to owners of homes, cars, stores, farms, service stations, boats, motorcycles, factories, offices.

Why Large Presto Profits Are So Easy Everyone is terrified at the very thought of FIRE! Every year fire kills more than 11,000 people—and destroys

dollars worth of property in The annual fire toll is more th BLE what it was 10 years ago! of people have been waiting for simple, inexpensive fire safeg most people who see Presto immediately want to buy one ESPECIALLY WHEN THE ONLY \$3.98 EACH!

You can demonstrate Presto minutes, and every sale will n or more. We give you free i your Demonstrator . . . free matically powerful) printed si rial to "talk from" . . . free testifying that Presto is GUAR FOR 20 YEARS!

YOU DON'T NEED TO IN PENNY. Just collect and &c more every time you write an c collect the balance and delive tinguisher. (Or if you with, yo from us at extra-low wholes: and then make up to \$2.18 unit supplying both dealers customers—we'll send you free

Get Started Now-Mall C Get started in this rich new Don't "put it off"! Every day tate may cost you \$10, \$15, or you could otherwise be making coupon NOW for everything ye get started right away! MERLIT TRIES, Inc., Dept. 116, 201 over SEVEN HUNDRED MILLION Street, New York 3, N. Y.



Yes, these were the findings of nated throat specialists after a total of 2,470 weekly examinations of the throats of hundreds of men and women who smoked Camels—and only Camels—for 30 consecutive days.



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THAT'S WHY I
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DOESN'T GO IN MY
JOB I SMOKE ONLY
CAMELS. THEY'RE
RIGHT FOR MY
THROAT ITHEY'RE
COOL AND MILD!"



TALK TO THOUSANDS

OF SHOPPERS, WHEN

I SMOKE, I HAVE TO

THUNK OF MY THROAT.

THAT'S WHY CAMELIS

MY CIGARETTE, CAMELS

ARE SO MILD!

COUNTY SEMONSTRATOR MADE INT OTHOWS

"SO-DAY MILDNESS TEST?

I'VE SMOKED CAMELS

FOR IT YEARS AND I
KNOW THEY AGREE WITH

MY THROAT! THEY RE

A GREAT-TASTING

F CIGARETTE, TOO!"

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You have the word of Camel smokers... of noted throat specialists... but test Camels for yourself in your "T Zone" (I for Taste and T for Throat). See if you don't agree that Camels are the mildest, best-tasting cigarette you ever smoked!

Start your own 30-Day Camel MILDNESS Test Today!